
USING ECONOMIC DATA IN
COMMERCIAL DIPLOMACY
MAKING RULE OF THUMB CALCULATIONS
ON THE ECONOMIC EFFECTS OF TRADE
POLICY DECISIONS

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PREFACE	5
Commercial Diplomacy & the Commercial Diplomat	5
The Challenge Addressed by this Manual	6
CHAPTER 1 INTRODUCTION TO THE USE OF ECONOMIC DATA IN COMMERCIAL DIPLOMACY	7
Why Is the Effective Use of Economic Data So Important?	7
For Whom and For What Areas of Trade and Investment Is This Relevant?	7
How Does Effective Use of Data Fit Into the Policy Process?	8
Interfacing with Economists	8
How to Use This Handbook	8
CHAPTER 2 ESTIMATING THE ECONOMIC MAGNITUDE OF TRADE POLICY ACTIONS	11
What Is A “Trade Policy” Issue?	11
Who Are the Stakeholders?	11
Gathering Relevant Data	12
Creating Initial Rough Estimates	13
APPENDIX DEFINING THE BOUNDARIES OF “TRADE POLICY”: WHAT DOES THE WTO RULING ON THE US FOREIGN SALES CORPORATIONS MEAN?	14
Background	14
The FSC system: How it works	14
Main points in the dispute-- A time line	15
Stakeholders	15
US Legislative Responses	16
Assessing the Monetary Dimension	16
Beyond trade	17
CHAPTER 3 ESTIMATING THE IMPACT OF TRADE POLICY CHANGES ON THE PRICE OF IMPORTED PRODUCTS AND ON TRADE IN SUCH PRODUCTS	20
Calculating the Price Impact of a Policy Action	21
Estimating How a Change in the Price of Imported Products Impacts Trade	22
Elasticities and Their Uses in Trade Policy Analysis	23
Own Price Elasticity of Demand	23
Import Price Elasticity	25
Cross-Price Elasticity of Demand	30
Income Elasticity of Demand	31
Price Elasticity of Supply	32
Elasticities in the Long Run	32
Some Cautions When Using Elasticities	33
Finding Elasticity Estimates	34
APPENDIX ELASTICITY POLICY CASES AND A NEW CALCULATION METHOD	36
CHAPTER 4 ESTIMATING THE IMPACT OF POLICY ACTIONS AFFECTING TRADE ON INDUSTRY REVENUES, COSTS, AND PROFITS	40
Calculating Changes in Production and Profits	42
APPENDIX IMPERFECT SUBSTITUTES	47
Partial Equilibrium, Imperfect Substitutes	47
Hints and Rules of Thumb	50
CHAPTER 5 ESTIMATING THE IMPACT OF TRADE POLICY ON JOBS AND WAGES	51
Direct Job Creation in Export Industries	52

Indirect Job Creation As a Result of Increased Exports	52
The Difference Between a New Job in an Industry and a New Job in the Economy	53
The Direct Employment Effects of an Increase in Imports	53
Impact of Trade on Labor Productivity and Wages.....	54
Indirect Impacts of Trade Policies on Jobs.....	55
CHAPTER 6 ESTIMATING THE COST OF PROTECTION TO CONSUMERS	57
Calculating Consumer Benefits and Costs when Price Effects are Known.....	57
Estimating the Price Effects of Trade Policy Actions.	58
APPENDIX THE ECONOMIC CONCEPT OF CONSUMER WELFARE AND HOW IT IS CALCULATED	60
Some Sample Calculations.....	61
CHAPTER 7 ESTIMATING THE ECONOMIC EFFICIENCY GAINS OF TRADE	63
Partial Equilibrium Measures of the Cost of Protection.....	64
Studies of the Impact of Trade Policies on National Welfare	68
APPENDIX CANADIAN EXPORTS OF SOFTWOOD LUMBER TO THE US: A HISTORY OF CONFLICT	69
Background information.....	69
Charges and counter-charges.....	71
Spin City: Lobbying efforts and coalitions.....	72
Evaluating the current impasse, its likely impact on stakeholders, and steps toward resolving the dispute	73
Resolving the dispute	76
CHAPTER 8 ESTIMATING THE IMPACT OF EXCHANGE RATE CHANGES ON THE PRICE OF IMPORTED PRODUCTS AND ON TRADE IN SUCH PRODUCTS.....	78
Why Worry About Exchange Rates?.....	78
Calculating the Impact of Exchange Rate Movements.....	78
Factoring Time into the Calculation of the Trade Effects of Currency Changes.....	79
Exchange Rates and Protectionism	83
Factoring Income Changes into the Calculation of the Trade Effects of Currency Changes	85
Impact of Exchange Rates on Investment Decisions and Trade-Related Jobs	86
Factors Influencing Exchange Rate Movements	86
CHAPTER 9 UNDERSTANDING AND WORKING WITH DATA GENERATED FROM ECONOMETRIC MODELS, INPUT-OUTPUT TABLES, CGE MODELS, AND SENSITIVITY ANALYSES	91
Econometric Models.....	91
Input-Output Tables	96
CGE Models.....	98
Sensitivity Analyses	99
CHAPTER 10 EFFECTIVE DATA PRESENTATION	101
The Five-Second Rule.....	101
Working with Time Series Data.....	101
Simple Line Graphs.....	101
Multiple Line Graphs	102
Manipulating Scales	103
Pie Charts	105
Vertical bar charts	107
Horizontal bar graphs	110
Combining Lines and Bars.....	111
Area diagrams	112
Scatter Diagrams	112
Using objects	113

Combining text with graphs	114
Appropriate use of 3-D.....	114
Summary	114
CHAPTER 11 DATA SOURCES FOR TRADE POLICY ANALYSIS	116
Types of data	116
APPENDIX APPENDIX TRADE DATA RESOURCES.....	118

PREFACE

The International Commercial Diplomacy Project (ICDP) develops and disseminates world-class training materials for commercial diplomats. Commercial diplomacy is a relatively new field encompassing policy advocacy, policymaking, and negotiations in international trade and investment. To strengthen professional training in commercial diplomacy, the ICDP has created model curricula, course outlines, teaching modules, case studies, negotiating simulations, and model operational documents, and has published these training tools on its website, www.commercialdiplomacy.org.

Commercial Diplomacy & the Commercial Diplomat

Commercial diplomacy is diplomacy with a commercial twist—diplomacy designed to influence government policy that affects global trade and investment. Commercial diplomacy encompasses the analysis, advocacy and negotiating chain leading to international agreements on the increasingly diverse set of trade-related issues.

The number of people involved in making and influencing trade policy has grown in tandem with the number of issues covered by trade negotiations. In today’s increasingly interdependent world, trade negotiations address a broad range of government regulations and actions that affect international commerce. They cover, for example:

- Tariffs, quotas, and customs procedures.
- Health, safety, and consumer and environmental protection standards.
- Regulation of such service industries as banking, telecommunications and accounting.
- Laws concerning fair competition, bribery, and corruption.
- Industry specific subsidy programs such as agricultural support programs.
- Trade-related investment measures.

The most visible commercial diplomats are those who work in ministries of trade and industry—those who negotiate international trade and investment agreements and resolve policy conflicts that impact international commerce. Commercial diplomacy skills are also required, however, by officials in other government departments and international organizations that have a stake in trade policy, including those concerned with foreign affairs, finance, agriculture, industry, labor, health, environmental protection, bank regulation, telecommunications, air transportation, and the licensing of professionals. Finally, commercial diplomacy skills are required by professionals and managers in a wide range of fields, including:

- Corporate government-relations departments.
- Overseas subsidiaries that interact with host government officials on a regular basis.
- Industry associations.
- Unions.
- Non-governmental organizations.

Because these individuals have a stake in the outcome of trade policy decisions, they engage in the domestic and global analyses, and advocacy and coalition-building processes that precede negotiations on international trade and investment issues. In order to influence this process, they need to be able to understand and address the economic impact of trade policy decisions.

The Challenge Addressed by this Manual

We see two gaps in the skills that many entry-level professionals bring to the practice of commercial diplomacy. The first gap is in understanding the impacts of commercial policy changes on private sector actors. How will firms adapt their production, ordering, hiring, and other decisions? What will be the impact on their bottom line? If there are commercial policy options to accomplish a certain goal, will those options have similar or very different impacts on workers, firms, suppliers, etc?

The second gap is in understanding the big picture of international commerce. How are international movements of goods related to international financial flows, movements of labor, and technology transfer? More simply, how does the economic health of an economy relate to international transactions in the long run?

These course materials seek to enable students and practitioners who may not have much mathematical or economics background to understand quantitative assessments provided by professional economists and to make basic rule of thumb calculations when a professional economist is not available. From the first sentence of the first chapter, the intent is to inform without either overwhelming or condescending. We hope to make the commercial diplomats more knowledgeable of the details and the big picture, thus reducing their dependence on specialists.

After discussing the skills actually used in entry-level commercial diplomacy jobs, we supply credible cases and stories to help students and practitioners address the challenging material in this manuscript. Our goal is to accompany each new concept with a real-world application of the concept, from the experience of commercial diplomats.

This manual serves three separate objectives. It is designed to help trade policy practitioners and students of commercial diplomacy who lack extensive training in economics and data analysis to make rule of thumb calculations of the economic impact of trade policy decisions; it is designed as a teaching manual for seminars and courses; and it is designed to give both the practitioner and the student a handy reference guide to other pedagogical resources.

The manual has been a collective effort. All four authors teach at the Monterey Institute of International Studies. Robert McCleery and Moyara Ruehsen teach courses on International Economics and Data Analysis for Commercial Diplomats, among other courses. Geza Feketekuty teaches courses related to the professional practice of commercial diplomacy. He is also the founder and President of the International Commercial Diplomacy Project, Inc. and developed the graduate program in commercial diplomacy at the Monterey Institute. Fernando De Paolis teaches a general course in Data Analysis and has done considerable research on trade impacts on industries and regions.

We hope that this manuscript, along with other teaching materials developed as part of the ICDP project, will help to create a common body of commercial diplomacy training materials for both professional school and on-the-job training programs. This, in turn, will forge a common body of knowledge for commercial diplomats, extending across national, disciplinary, and sectoral divisions.

CHAPTER 1 INTRODUCTION TO THE USE OF ECONOMIC DATA IN COMMERCIAL DIPLOMACY

Why Is the Effective Use of Economic Data So Important?

The whole chain of policy analysis, policy-making, advocacy, and negotiations leading to international agreements on international trade and investment issues has come to be referred to as commercial diplomacy, a term we will use frequently in this volume. The field of commercial diplomacy is practiced by a variety of professionals including trade policy makers, trade negotiators, private industry representatives and many other players who have a stake in policy decisions affecting international trade and investment. To be truly effective in this area, the commercial diplomat must utilize the full range of political advocacy tools and techniques to obtain government decisions favorable to the stakeholders he or she represents. In short, commercial diplomacy is all about persuasion, and economic data play an extremely important role in persuasion. The commercial diplomat must be able to support arguments in favor of policy positions with data highlighting the economic impact of policy decisions on key stakeholders and on the country as a whole. Learning how to use economic data effectively is therefore one of the critical skills in commercial diplomacy.

For Whom and For What Areas of Trade and Investment Is This Relevant?

In the past commercial diplomacy was concerned largely with negotiations over tariffs and quotas on imports. In today's more interdependent world, trade negotiations cover a much wider range of government regulations and actions that affect international commerce. These include:

- Standards for health, safety, environment, and consumer protection.
- Regulations covering services such as banking, telecommunications and accounting.
- Competition policy.
- Laws concerning bribery and corruption.
- Agricultural support programs.
- Industrial subsidies.
- Policies affecting foreign investment and foreign exchange controls.
- Historically “domestic” policy issues, such as taxation and immigration policies.

The primary practitioners of commercial diplomacy are trade officials, who are charged with solving trade problems created by government policy actions and negotiating international trade and investment agreements. Commercial diplomacy skills are also required of officials in many other government departments and ministries with trade-related responsibilities—covering foreign affairs, finance, agriculture, industry, labor, health, the environment, the regulation of banks, telecommunications, air transportation, or the licensing of professionals. The same skills are also required of managers in international government relations departments of industry associations, corporations, unions and non-governmental organizations. These organizations frequently have a stake in the outcome of trade policy decisions, and therefore play a role in the domestic and global political advocacy and coalition-building process which usually precedes government-to-government negotiations on international trade and investment issues. Skill in commercial diplomacy is required of corporate managers posted in foreign countries, who must interact extensively with the host government on a broad range of regulatory issues, and officials in international organizations dealing with global trade, investment and trade-related regulatory issues.

How Does Effective Use of Data Fit Into the Policy Process?

There are three main stages to the policy process, and data and data analysis play an important role in all three. The first stage of the policy process is collecting relevant data on current and proposed policies, trade flows, production and employment levels in the industry and linkages to other industries. Chapter 11 includes a list of sources for the basic data needed for the mentioned analysis.

In the second stage of the policy development process, the commercial diplomat seeks guidance from supervisors on a proposed course of action and seeks to develop consensus among participants who share the same interests. The commercial diplomat must be able to identify the most important economic impacts from the point of view of all relevant decision makers. In seeking to persuade a boss, colleague, potential coalition partner, legislator, or the public at large on the desirability of a particular course of action, it is usually not enough to make good arguments. Good arguments must be bolstered with hard facts and quantitative estimates of the impacts of the proposed policy action. Moreover, it is necessary to crystallize the issue by finding and highlighting the key economic issue that will persuade stakeholders that their interests are best served by a particular course of action.

Interfacing with Economists

The object of this handbook is not to make commercial diplomats into PhD economists. That task is too difficult and not necessary. Instead, it is to make the commercial diplomat both less dependent on economists and more knowledgeable and critical of the work of economists.

There is an expression, that “A little bit of knowledge is a dangerous thing.” We intend both to raise the level of your economics awareness and effectiveness, and to show the limitation of some of the back-of-the-envelope tools presented here. We hope the result is to increase the respect economists have for commercial diplomats, and vice versa.

“The commercial diplomat is the international economist’s worst nightmare: an advocate on behalf of trade policy ‘stakeholders,’ armed with just enough economics to be convincing to policymakers but not enough to be encumbered by the truth.” The statement above, by an international economist active in the trade arena, portrays the current situation at its worst. That person says that an ideal would be “to help commercial diplomats understand and communicate with economists, in the interest of bringing about better, or at least better informed, trade policy decisions.”

How to Use This Handbook

This handbook serves three separate objectives. First and foremost, it is designed to equip trade policy practitioners with the analytical tools to understand and make quick “back of the envelope” calculations on the economic impact of policy decisions affecting international trade and investment. The commercial diplomat must understand the impact on the constituency he or she represents, the impact on other key stakeholders, and the impact on the country at large. Chapters 3 through 8 offer detailed guidelines and some simple rules of thumb, while also alerting readers to caveats and potential pitfalls in such calculations. Each chapter is organized around the calculations of a specific impact or group of impacts. These include the impacts of trade policies on prices, trade flows, industry revenues, costs, profits, jobs, wages, economic efficiency, the cost to taxpayers, and the broader national interest, as well as the impacts of monetary and fiscal policy on trade.

Often, the determination of each impact involves a chain of calculations. The chapters in this handbook, after providing background discussion on each issue, aim to provide basic “recipe”

guidelines for each series of calculations. For example, suppose we wish to determine the impact of a proposed trade policy on the profits of producers. This seemingly simple calculation still involves at least five steps.¹

- 1) Determine how the policy action affects costs for relevant producers, importers and exporters.
- 2) Determine how those changes in costs will affect the retail prices of the goods offered for sale in the home market and/or the foreign market.
- 3) Calculate how the changes in prices will affect the demand for exports in the foreign market and the demand for imports and import substitutes in the home market.
- 4) Calculate how suppliers will respond to the changes in demand.
- 5) Calculate how the change in the costs and revenues of producers translates into changes in profits.

If we wish to take this a step further and calculate the impact of this same policy decision on workers, we would need to add three additional steps.

- 6) Calculate how changes in production obtained from the above calculations translate into changes in the number of jobs available in the industry.
- 7) Estimate how changes in the industry's conditions affect productivity of workers and the wages they can earn as a result.
- 8) Estimate, using elements of the seven steps above, the impact of the policy on *related* industries.

Going through each of the steps outlined above is not merely a simple mechanical process. First, we must assemble considerable data on current production, trade, costs, prices, employment and wages. We also must acquire reliable information on historical relationships between price changes in the industry and changes in the amount of a product consumers wish to buy or producers wish to sell at those prices. Each of these tasks is handled in the individual chapters, with tips to streamline the process as much as possible without compromising the final results.

The economic impacts of trade policy actions, of course, are not the only policy impacts that matter. Policy decisions that affect global trade and investment flows inevitably affect such other policy dimensions as health, safety, environment, foreign policy, or national security. Estimating these other policy impacts largely requires other policy tools that are treated elsewhere. Exclusion from this handbook is not meant to signal that they are not important, or less important.

Second, this handbook is designed as a teaching manual for seminars and courses, with sample cases described throughout. A separate packet of problem sets, answer keys, and PowerPoint presentations is also available. The cases and problem sets have all been used and tested with graduate students in the Commercial Diplomacy Program at the Monterey Institute of International Studies in Monterey, California.

Third, this handbook is designed to give the practitioner and the student tools to estimate the economic effects of trade policy decisions, and tools to test and present results of earlier calculations. It shows them how to apply and to interpret basic economic tools, how to use simple mathematical

¹ In this example we have omitted the additional consideration necessary in analyzing the case of intermediate goods, and their impact on corresponding final products. An additional real world complexity is the degree to which manufacturers control retail prices or large retailers affect wholesale prices.

calculations, how to read graphs and economic diagrams, and when and how to use them to illustrate a point most effectively.

Chapter 9 demonstrates how to interpret the results produced by more rigorous empirical investigations carried out by professionally trained economists. These more rigorous methods require econometric models and sophisticated statistical testing. In an ideal world all calculations of the economic impact of policy decisions would be delegated to professionally trained economists, these economists would all agree on the correct way to approach the problem, and would write up their results clearly, without jargon. In the real world, however, the commercial diplomat often has neither the time nor the resources to call in the economists. Existing studies, if they can be found, may use different methodologies and reach different conclusions (to the extent that a non-specialist can understand their conclusions!). Fortunately, in many cases the added precision from running econometric models is simply unnecessary for the ball-park estimates typically used in political discussions, public policy advocacy, coalition building and negotiation. There may be instances, however, when the quality of the decision-making process can be improved by access to the results of econometric modeling and more sophisticated statistical testing. The decision-makers themselves, however, usually do not have the training to understand the technical jargon in which the results are couched. In such cases, it is up to the commercial diplomat to interpret these results for the decision-makers. The chapter covering these topics is specifically designed to show commercial diplomats how to do this.

This handbook has intentionally been written in a manner that even practitioners of commercial diplomacy *without* formal training in economics can understand. However, a basic understanding of key economic principles clearly will make it easier to follow. Those with additional training in economics can take advantage of the more rigorous presentations provided in each chapter, and of the references provided at the end of each chapter which point to more in-depth treatment of the subject matter covered. No attempt is made to teach the reader how to build econometric models or how to use sophisticated statistical tools, though one chapter is devoted to interpreting the results of such models and techniques.

CHAPTER 2 ESTIMATING THE ECONOMIC MAGNITUDE OF TRADE POLICY ACTIONS

To understand the impact of trade policy actions, we need to review the foundation on which trade theory rests. This foundation is based on the work of David Ricardo in the early 1800s. The crucial concept is *comparative advantage*, which motivates gains from trade among countries that are able to produce similar products.

A country has a comparative advantage in production of a certain product if it can produce that product at a lower *opportunity cost*. Opportunity cost is the amount of another product that cannot be produced as a result of the decision to produce the first product. In other words, if Ireland can produce 20 more computers by not producing one car, while Germany can produce one more car at the expense of 12 computers, then Ireland has a lower opportunity cost in producing computers and Germany has a lower opportunity cost in producing cars. Thus, there are gains from bilateral trade, with Ireland exporting computers and importing German cars, and freer trade between the two countries will lead to an expansion in Ireland's computer industry and contraction in its auto industry.

In this chapter we will consider how to obtain an initial assessment of the relative economic importance of a decision and whom it will affect. This chapter describes how an analyst can quickly assemble readily available data on the policy measure and on the affected industries.

What Is A "Trade Policy" Issue?

One might think the boundaries of trade policy would be self-evident. However, commercial diplomats must think in broad terms about a wide range of policy issues that affect trade flows. From EU directives to US tax laws (see the appendix for details of the US Foreign Sales Corporations and the WTO rulings) to state of California rulings on gasoline additives, virtually any policy action that will have a differential impact on domestic and foreign firms can be a WTO case.

This modern day reality has two main implications. First, the commercial diplomat must be a quick study, as it is impossible to keep current with every single aspect of policy that may result in a trade dispute. Secondly, the toolbox of techniques a commercial diplomat must command is expanding. While understanding the basics of tariffs, quotas, and other traditional trade restrictions is still necessary, it is insufficient for the wide range of issues that arise during one's professional career.

All of these trade-related issues, broadly defined, have certain characteristics in common. Stakeholders must be identified, data collected, and analysis performed to generate rough estimates of the likely impacts on domestic stakeholders.

Who Are the Stakeholders?

Commercial diplomacy affects the economic interests of a variety of stakeholders.

The stakeholders are those producers, importers, exporters, consumers, workers, government (and indirectly the taxpayers), and other interested parties who are directly affected by the policy action.

For sound trade policy advocacy, trade policymaking and trade negotiating decisions, it is important to understand stakeholders' economic interests.

The number of industries likely affected by an issue or policy action, the volume of production affected, the trade, and jobs accounted for by such industries are of economic importance to potential stakeholders. It is also vital information for politicians and politically inclined decision-makers. Getting the attention of a busy decision-maker is often the first challenge for a commercial diplomat, and data on the size of affected sectors is an avenue for getting that attention. Even before that, in the absence of guidance from superiors, such data can indicate whether it is worth probing deeper into the issue and the relevant economic data.

The amount of trade "covered" by liberalizing or protectionist action, or the amount of jobs directly affected by a trade action, is often described as "coverage." In situations where data is unavailable or the complexity of an issue makes it impossible to develop a defensible quantitative estimate of the policy impact, coverage can become a rough measuring rod for policy decisions. Trade negotiators and politicians thus often discuss the amount of trade "covered" by liberalizing or protectionist actions as a proxy for the importance of the issue.

Estimating the trade or industry coverage of a policy issue or action involves two simple steps—first, deciding which industries or industry sub-sectors are likely affected, and second, finding sources of data. The first step involves qualitative judgments specific to each case. The second step of data collection is more of a challenge, and is addressed below and in the final chapter of this handbook.

Gathering Relevant Data

There are two ways to acquire industry data—by asking the industry and by searching out government data and other published economic data. When working with private data generated by an interested party, it is, of course, always useful to find corroborating data from public and third party sources.

Data sources for much of the economic information treated in this handbook are found in the last chapter. Other sources of data can be found under the web links section of the International Commercial Diplomacy Project's web site, <http://www.commercialdiplomacy.com/>.

When a policy issue primarily affects only a component of an industry it may be difficult or impossible to find data limited to that component. In such cases the analyst may use overall industry data as a proxy. This is legitimate when the component involved accounts for a substantial portion of the industry, or when the component is seen as critical to the industry as a whole. In other cases there may be little justification for using such industry-wide data. In using such data it is important to ask whether others will see it as a legitimate proxy or as an exaggeration. When the use of such data does not meet the basic laugh test, it undermines the credibility of the author. By the same token, when interpreting data presented by others, it is worth probing what the data actually covers.

One of the problems in establishing the volume of production, trade and jobs in industries affected by policy decisions is that the data published for production, employment, and trade frequently use different classification systems. This is true, for example, for data series published by the US government for US domestic production, employment and trade, each of which has its own definition of industry. Also, the way in which data is collected and how it is coded sometimes changes, as it did in 2000. In the year 2000, the Standard Industrial Classification (S.I.C.) codes used in the US for many years were eliminated and replaced with the North American Industrial Classification System (N.A.I.C.S.). There is no similarity whatsoever between the two methods of coding. The old SIC code for grapes, for example, was 0172. The new NAICS code for grapes is 111332. To make matters more confusing, U.S. trade data is coded using the harmonized tariff

system (H.T.S., or H.S.), a standard coding system used throughout the world. This classification system, which uses 10 digit codes, also does not match up neatly with the industrial classification systems described above. The H.S. codes are specific and detailed, whereas US industrial data is coded into broader categories. Similar problems arise in other countries.

So how does one reconcile these discrepancies and match up the differently coded data sets? One approach to solving this problem is to use a concordance for matching one statistical series to another. Officials in the US Commerce Department, for example, periodically put together an unofficial concordance for matching the production data to the trade data. These harmonizing concordances are available on the web at <http://www.census.gov/foreign-trade/www/>. For most quick, back of the envelope calculations it is not practical to harmonize the data series, however, and the analyst is left with the option of using whatever industry categories establish a best fit among the various classification systems. It is important for the analyst in such cases to identify clearly the sources of data used and to call attention to any differences in industry definitions.

Creating Initial Rough Estimates

When information about the nature and magnitude of the policy action is combined with information about the amount of trade or production affected by the policy action, it is possible in many cases to convey a good idea of the likely economic impact. In some cases, policymakers want to hear whether a particular issue is sufficiently important to deserve analysis. In some cases, the answer is obvious. In the case of the FSC ruling detailed in the appendix, the magnitude of the estimated benefits to US exporters (\$4.2 billion by one estimate and \$4.8 billion by another) and the magnitude of the WTO sanction (\$4 billion) make it clear that the issues are important to the US. When several sources or several methods concur on a rough magnitude of the expected effect, we can be more certain of the importance of the issue we are studying.

In some cases, you will be asked to make those initial estimates yourself. Let us take the example of a “foreign country,” which we will call Xenia. Xenia proposes to cut its 10% duty on car imports in half to 5%. Our “home country” now exports cars worth \$10 billion to Xenia, out of total exports of \$200 billion. Assume the total size of the “home” economy \$1 trillion. With this information we are in a fairly good position to conclude that the impact will be significant. How do we know this?

Let us assume that the overall output and employment of the auto industry is \$50 billion and 300,000 respectively (information which can be obtained fairly easily). One option is for producers to capture the extra \$500 million (\$10 billion * 5%) as additional profits. Another option, more likely in a highly competitive market, is to cut price by 5% and increase output to gain market share. It is an open question whether exporters will choose to cut their delivered price by 5%, increase their profit margin by 5%, or some combination of the two.

Where the proposed policy action does not take the form of a tariff cut or increase, it is useful to translate that policy’s impacts into an equivalent tariff or subsidy. The first thing to discover is whether the proposed policy action changes incentives for producers. If not, it is just a matter of calculating the direct impact. Such measures are called by economists *lump sum* taxes or subsidies.

If incentives change, we need to estimate the actual response by producers. This is done by calculating how the proposed policy action will affect incentives such as costs and prices, and then translating that into an equivalent tariff cut or increase (or an equivalent change in a subsidy). Thus, if we know that the proposed policy action will reduce the marginal costs of exporters by \$5 million, and the total exports by the industry amount to \$100 million, we can say that the proposed policy action has an effect equivalent to eliminating a 5% tariff. More will be said on this in later chapters.

APPENDIX DEFINING THE BOUNDARIES OF “TRADE POLICY”: WHAT DOES THE WTO RULING ON THE US FOREIGN SALES CORPORATIONS MEAN?

Background

Europe and the United States have been at war for the last 20 years. Not against a common enemy, but against each other in a conflict over taxation rules and export subsidies. Most countries tax income earned within their borders. Hence, value added taxes (VAT) collected as a product go through the distribution system within a country and are rebated to exporters. The US is an anomaly, in that it taxes its corporations (and citizens) on their *world-wide* income, and has no VAT. Hence, these conflicting rules create a *relative* incentive to export in the EU and other countries with the VAT system, as opposed to the United States. The United States has been looking for ways to remedy this imbalance (without fundamentally changing its taxation system) for the last 30 years.

The United States' first attempt to rectify this imbalance came in 1971 with the formation of the *Domestic International Sales Corporation* (or DISC) as a form of export promotion. The European Community challenged the DISC, alleging that it constituted an export subsidy “because it resulted in exports being taxed more favorably than comparable domestic transactions.”² The US counter-argument was that Belgium, France, and the Netherlands have similar regimes, but no charges were filed in GATT against those three countries. As a result of the EC claim, DISC was declared illegal by a GATT panel in 1976. After extensive discussions, the US replaced the DISC with the *Foreign Sales Corporation* program (FSC) in 1984.

The FSC was integrated into the Tax Reform Act of 1984, which provided for a reduction in income taxes on net foreign profit realized from exports if a new structure, a Foreign Sales Corporation, was in existence. In essence, rather than tax 100% of foreign profits and then return some form of a rebate, the FSC approach allows exporters to simply reduce their tax bill on foreign profits by a minimum of 15% and a maximum of 30%.³

*The FSC system: How it works.*⁴

- 1) Any US company whose exports have at least 50% US content can set up a Foreign Sales Corporation, a shell company established in a tax haven. Among the thousands of US companies with FSCs are GE, Monsanto, Microsoft, Ford, Exxon/Mobil, Motorola, Boeing and Procter & Gamble.
- 2) More than 90% of FSCs are in the Virgin Islands, Barbados, and Guam. According to the EU, there are “letterbox” companies that will manage an FSC for just \$2,000 a year. Estimates of the number of companies with FSCs vary from 3,000 to 7,000.
- 3) The US company “sells” its exports to the FSC which then “exports” them. However, no physical transaction takes place. Instead, the FSC subcontracts the physical handling of the exports and other economic activities back to the parent company.

² The US mission to the European Union (<http://www.useu.be/ISSUES/FSCdossier.html>)

³ <http://www.exportfsc.com/aboutfsc.html>

⁴ Financial Times. February 25, 2000.

- 4) Part of the FSC's income—as much as 65%— is exempt from US taxes. The remainder of the income is taxed by the tax haven (minimally). Dividends by the FSC to the parent company are not taxed. Using a FSC can reduce a company's tax bill between 15% and 30%.

Main points in the dispute—A time line

While the EU was not satisfied with the FSC, it chose not to challenge the FSC between 1984 and 1997. However, beginning in 1997, the EU renewed bilateral consultations with the US on the issue, and in December of 1997 the UE initiated formal consultations with the US under the new WTO Dispute Settlement System. After these and subsequent consultations in February and April of 1998 failed to resolve the issue satisfactorily, in September of 1998 the EU requested the establishment of a formal dispute settlement panel.

In late July 1999, the WTO dispute panel issued a preliminary report backing the EU complaint, and in September of the same year issued a final report indicating that the FSC as then constituted was inconsistent with WTO obligations and called for appropriate changes by October 1, 2000. The US appealed the WTO findings, arguing that the FSC entity created a level field in global markets to offset advantages enjoyed by EU-based companies exempted from the value added tax (VAT) on exports.⁵

On March 20, 2000, the WTO dispute settlement body (DSB) adopted the reports of the Panel and the Appellate Body, finding that the FSC provisions prohibited export subsidies. It recommended that the US bring its provisions under the FSC into conformity with the WTO rules by October 1, 2000. Subsequently, the WTO approved an US-EU procedural agreement that extended this date to November 1, 2000. The US then faced a decision on how to change its tax provisions under the FSC to make them consistent with WTO rules. To better understand the US government response to this dilemma, we first must consider the main stakeholders in the process, particularly in the US.

Stakeholders

The major stakeholders in the US were US exporters, who were the main beneficiaries under the FSC system, first among them being Boeing, the aerospace company that is the single largest US exporter. The US Congress and US Trade Representative, acting on behalf of those companies in response to a foreign challenge, can also be considered as stakeholders. In the long-run, and as a result of investment realignment, there could be a reduction in the labor force of firms affected by a repeal of the export subsidies. Boeing has claimed that as many as 9600 workers could be affected as a result of the change in tax incentives. Hence workers, particularly unionized workers, have a stake in the continued existence of this tax break.

Opposing the FSC system are foreign companies competing with US exports, both in their home market and in third country markets around the world. Their home governments, acting on their behalf, are challenging the legality of this system in the WTO. They might see US consumers and taxpayers as natural allies. Reduced tax payments by major US exporters require a larger share of the tax burden to be borne by personal income taxes and corporate taxes by non-FSC participants. Consumers would clearly be impacted if cross-Atlantic trade were restricted as a consequence of retaliatory measures imposed by either or both trading partners.

⁵ Belmonte, Cynthia. Foreign Sales Corporations, 1996. *SOI Bulletin*, Spring 2000, 19(4), 87-122.

US Legislative Responses

On July 27, 2002 the House Ways and Means Committee approved, by a vote of 34–1, legislation they claimed would:

- 1) repeal the FSC provisions
- 2) establish a new regime for extraterritorial income that is WTO-consistent
- 3) respond to certain EU concerns about the May 2 proposal.

On July 28, Treasury Deputy Secretary Stuart Eizenstat presented EU Trade Commissioner Pascal Lamy with a copy of the draft replacement legislation and explanatory materials, and indicated that the United States was prepared to negotiate a solution on the basis of this legislation.

On August 31, 2002, the Commissioner rejected the replacement legislation, stating that it could not be the basis of negotiations. Specifically, Commissioner Lamy contended that under the replacement legislation:

- 1) a subsidy still existed
- 2) this subsidy was export contingent
- 3) the subsidy was contingent upon the use of domestic over imported goods
- 4) the transition period for eliminating the FSC subsidies was too long

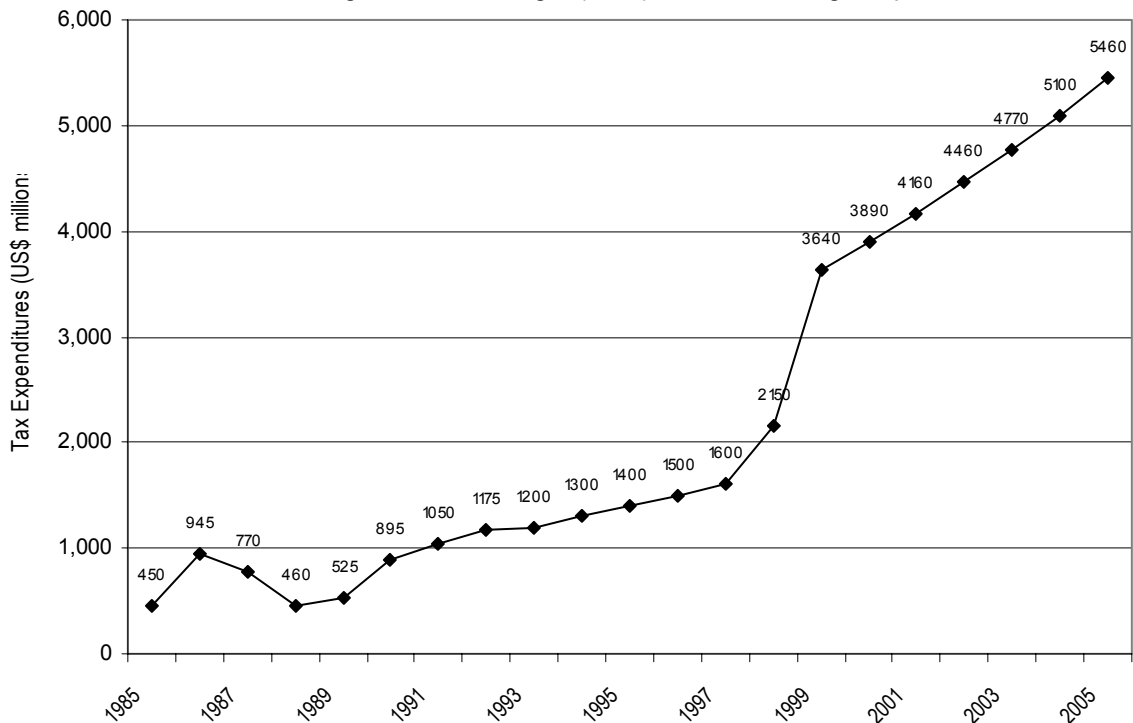
In September 2002, the WTO arbitrators said the EU could, if it wanted, impose sanctions worth \$4 billion, which represented the largest approved sanctions in WTO/GATT history. Hence the failure of the two sides to negotiate an acceptable agreement could trigger the biggest trade war since the Great Depression.

Assessing the Monetary Dimension

The following figure shows the evolution of actual and projected tax expenditures for export subsidies.⁶ The values are relatively low, with small rates of growth for the period between 1985 and 1997. After that, it more than doubled between 1997 and 1999, from \$1.6 billion to over \$3.6 billion. The rate of growth for the projected period between 2001 and 2005 is considerably higher than that corresponding to the 1985–1997 period.

⁶ Data Source: Desai, M and Hines, J. “The Uneasy Marriage of Exports Incentives and the Income Tax.” October 2000. In *Tax Policy and the Economy* (15), edited by James Poterba. MIT Press (2001): 41-94.

Actual and Projected Tax Expenditures for Export Subsidies, 1985-2005
Office of Management and Budget (2000) and earlier budget reports



What is next?

Several factors are worth noting at this point. First, countries have considerable latitude in what practices they bring to the attention of the WTO. The rapid growth in the use of the FSC since 1997 contributed to its rise atop of US-EU trade disputes. Yet experts describe the EU's motivation as retaliation against a number of cases brought by the US on politically sensitive agricultural issues. Secondly, the EU now has a serious problem with how to proceed, given that it has "won." Actually instituting the \$4 billion in trade sanctions would have a disastrous effect on the economies of both the US and EU. Yet this superior position can only be used to leverage policies in your favor if you are willing to use it. As the US learned during the cold war, nuclear deterrence works only on large things, not small, since it requires you to think the unthinkable. Third, no single dispute arises in a vacuum. While the US is clearly breaking international rules with the FSC, the EU's policies on beef, bananas, and other elements of the common agricultural policy are equally suspect. The goal of the EU may be to force the US off the attack on entirely unrelated issues. The FSC ruling by the WTO, combined with the recent increase in US agricultural subsidies and steel tariffs, may erode the US moral high ground for arguing for increased openness in agricultural trade as part of the Doha round.

Beyond trade

The true nature of the FSC problem is not connected to trade policy actions *per se*, but it is rooted in international differences in tax structure. When WTO rulings seem to infringe on a country's rights to determine national rules on such seemingly domestic policies as corporate taxation, environmental policies, etc., national governments (particularly in global powers like the US) may react badly. Why is the WTO taking this gamble?

To understand the non-trade origins and trade-related connections of this dispute, we need briefly to review the existing tax schemes. There are essentially three ways to deal with income earned abroad. The first one, which the US currently applies, is the *global* regime, which essentially taxes all income of American entities, corporate or individual, regardless of location. Under this scheme, US corporations may be subjected to double taxation (except in countries with specific tax treaties with the US), which, in turn, puts them at disadvantage in terms of global competition. On the other end of the spectrum, there is the *territorial* taxation scheme, by which corporations are taxed only by the local territorial authority. This is the scheme used by Europe and many other countries. The US Congress is crafting legislation to move the American tax philosophy to a point between the two mentioned systems. That proposed system, also referred to as the *deferral* system, would seek to tax only that part of income earned abroad that is repatriated.⁷

To a certain extent, the FSC program was designed to offset the adverse effects of comparative tax policies on American corporations operating abroad. However, that particular mode of compensation triggered the reaction of the European Union and WTO intervention. Over the past decade, tax rates have declined in most nations, while they increased in the US, further disadvantaging US exporters.

The forces of globalization are pushing national governments to harmonize inconsistent policies, particularly tax policies, or face potential capital flight to countries with more favorable regimes. While the US would like those policies to be “harmonized” by the rest of the world adapting to them, in many areas this would be less efficient and is highly unlikely.⁸ The combination of value added taxation and territorial taxation is well-entrenched in Europe, Latin America, and elsewhere, and demonstrably more efficient. It is likely that even more pain must be endured by the US (and its trading partners) before such harmonization is achieved.

One could consider what the real effects of a substantial reform of the US tax code would be on trade patterns and terms of trade. In general, the agreement among professional economists is that export subsidies are bad, particularly in the case of a large country, which can cause a decline in world prices as a result of the subsidies. Even in cases where terms of trade are not affected, countries do not necessarily benefit from export subsidies in the form of reduced trade deficits.

More specifically, in the United States today, changing the tax philosophy (i.e., a shift from taxing investments and savings with income-based taxes to taxing consumption with something like a VAT), would add an additional layer of uncertainty to an already uncertain future. As the so-called

⁷ Taxing only repatriated foreign income has its own dangers and inefficiencies. It encourages the reinvestment of profits abroad and discourages repatriation of profits, hence encouraging additional foreign investments while discouraging domestic investment.

⁸ See also the discussion of harmonizing patent regimes in the appendix. The US (after the recent policy change in the Philippines) is the only country in the world that grants patents on a first to invent rather than a first to file basis.

baby-boomers” prepare to retire, it is expected that consumption and savings (and investment) patterns will change significantly in the next five to ten years. Even a tax change that is fiscally neutral *today* could have important repercussion in the future, as the economy changes. However, many economists argue that a consumption-based tax would both improve the balance of trade and raise the (currently negative!) rate of personal savings in the US by altering incentives.⁹

⁹ The case could be reduced to a national income accounting identity taking the following form: $(X-M) = (S-I) + (T-G)$, where X is exports, M is imports, S is savings, I is investments, T is tax-revenue, and G is government expending. If the tax reform raises savings (relative to investment) and is revenue neutral (T is unchanged), the trade balance must improve.

CHAPTER 3 ESTIMATING THE IMPACT OF TRADE POLICY CHANGES ON THE PRICE OF IMPORTED PRODUCTS AND ON TRADE IN SUCH PRODUCTS

One of the most frequently raised questions on policy actions covered by commercial diplomacy is the impact on trade flows. Understanding and communicating the impact of trade policy on trade, and ultimately on revenues, costs, profits, wages and jobs, is the foundation of commercial diplomacy. While economists tend to emphasize the economic efficiency and consumer benefits of trade, the political debate over trade is dominated by arguments over the benefit of increased exports to producers in export industries, and the loss generated by increased imports for producers in import-competing industries. In other words, economists see imports as good, because they allow consumption of goods produced using another country's resources, and exports as necessary to finance imports, while policymakers often see imports as a threat to domestic producers and interest groups, and exports as a source of new wealth, increased national output, employment, profits, and tax revenues. These policy perceptions are reinforced politically by producers being better organized politically than consumers. Consumer organizations are often co-opted by producer interests. This can result in a *mercantilist* tilt to trade policy.

Mercantilists of the 18th century believed that exports were good and imports were bad. Therefore the role of trade policy was to create a trade surplus that would result in an inflow of gold and stimulate the domestic economy. Adam Smith's *Wealth of Nations* explained the fallacy of the mercantilist argument, but the political strength of producer interests has preserved the mercantilist element in trade policy.

In view of these political realities, proponents of trade liberalization usually focus on new export opportunities created by reducing foreign trade barriers, while opponents of trade liberalization focus on the displacement of domestic production through increased imports.

In this chapter we review the steps necessary to calculate the impact of trade policy on trade flows, and in subsequent chapters we will review the steps necessary to calculate the impact on revenues, costs, profits, wages and jobs. Calculating the impact of a policy measure on trade is generally a two-step process. First, the analyst must calculate the effect of the policy action on the price at which the good or service could be sold in the import market, and second the analyst must calculate the impact of the potential change in price on the quantity consumers wish to purchase. Our starting point is small countries, which can buy as much as they wish at a constant world price.

For a large country like the United States, a third step is necessary. The analyst must determine if the change in import demand for a product is sufficient to alter the world price of that product. For economists, the definition of a "large" or "small" country is product specific, and rests on whether a policy change in that producing or consuming country has a noticeable impact on world price. Thus Kuwait, despite its small land area and low population, may be a large country in the oil market, while India may be considered small in many manufactured goods markets like autos and aircraft. In general, the analysis of trade effects is complicated by any departure from the assumption of *perfect competition* built into most economic models.

Perfect competition is the assumption that the market is composed of many small producers and consumers acting independently, freely entering and exiting the market as profitability dictates, with all producers making identical products. Hence, no market participant can manipulate prices.

Calculating the Price Impact of a Policy Action

Tariffs: We start with the case of a small county in a competitive market. We will later discuss some of the complexities introduced by large countries and large firms that can affect world prices. Calculating the impact of the policy action on price is a fairly straightforward calculation in the case of changes to *ad valorem tariffs* or other fees on imported products in proportion to its price.

As the above sentence indicates, ad valorem tariffs are those imposed in proportion to the price of an item. Hence a 10% tariff imposed on imports of books would require payment of \$1 in duties for a \$10 book, \$5 on a \$50 book, etc. The other main type of tariff is a specific tariff, which is a set dollar amount of duty imposed per unit of imports. A *specific tariff* of \$2 per book, in the above example, would raise \$4 in duties on the two books.

Provided both the importers and domestic retailers are operating under competitive market conditions, we can assume that the increase or reduction of the tariff is passed on to the consumer. Thus a 50% reduction of an 80% duty translates into a 22% percent reduction of the consumer price in the import market. Here is an example: assuming the world price is \$1, a 50% cut in the 80% tariff translates into a price reduction of \$0.40 from \$1.80 to \$1.40.¹⁰ Note, however, that a 50% reduction of a 10% duty translates into only a 4 ½ percent cut in the retail price of the import (assuming again that the import price is \$1, a 50% cut in the 10% duty translates into a 5 cent cut from \$1.10). The general formula for calculating the change in price is the change in the tariff divided by one plus the original tariff rate. The same calculation can be applied to any fee on an imported product in proportion to its price.

$$\% \Delta \text{Price} = (\text{New Tariff} - \text{Old Tariff}) / (1 + \text{Old Tariff})$$

Calculating the impact of the change of a tariff or a fee in a noncompetitive market situation, where there is a restraint on competition at either the import or retail stage, is more difficult. In a less than fully competitive market, either the importer or the retailer may pass on only a portion of the reduced fee or tariff, keeping the rest for increased profits. This is called *incomplete pass through* in the economists' jargon. The only good way to calculate the extent to which the reduced tariff will reduce prices in the import market is to investigate what happened in previous occasions where the duties were cut, assuming no major change in market structure in the meantime. With a little research you may find studies done by economists, which can give you a rough estimate. Note that studies of *exchange rate pass through*, a concept we introduce in Chapter 8, are similar but not identical. In other cases, you may have to survey practitioners or examine historical data to develop an estimate.

Quotas: Another common policy action is the reduction or increase of an import quota. Translating a change in the quota to a price change is complicated, but in most cases not necessary for calculating an impact on trade as long as the changed quota continues to restrict trade. In such a case we can assume that trade is increased (reduced) by the full increase (reduction) in the quota. Where the quota that emerges from the change in policy does not bind trade, as happens frequently in the case of textile quotas allocated to highly specific apparel items, you must resort to estimates based on a survey of practitioners or an examination of historical data.

¹⁰ Prior to the tariff change, domestic consumers paid \$1.80 for the imported product, \$1 to the foreign producer and \$0.80 to the government. The tariff reduction halves the payment to the government to \$0.40. In percentage terms, this is can be expressed as about a 22% reduction in price.

When a particular regulation overshadows all other import-related regulations, an initial approach to estimating the price effect of removing the regulation is to examine the difference in the price at which the product is sold in the export and import market and to deduct from that price difference all other known costs such as shipping, tariffs, fees, insurance, etc. Since a single regulation seldom is the only cost element that cannot be clearly identified, and differences in retailing costs also play an important role, there is usually a great deal of controversy around such estimates. They nevertheless provide a useful starting point for a more detailed analysis. Additional details and examples of this technique are found later in this chapter.

Estimating How a Change in the Price of Imported Products Impacts Trade

Estimating the impact of a change in the price of an imported product on trade in that product involves another two-step process. Economists call the factor used to calculate the direct impact the *price elasticity of demand*.

The price elasticity of demand (PED) measures consumer response to price changes, and varies from commodity to commodity, from country to country, and from common items of daily consumption to luxury goods. Since demand curves are downward sloping, the coefficients of price elasticity of demand are *always* negative. The negative sign is omitted for simplicity.

When a percentage reduction in the price leads to a less than proportional increase in quantity demanded, economists say that the demand is inelastic, and when quantity demanded changes more than the change in price, economists say the demand is elastic. Economists estimate a numeric value for this elasticity. A value of 1 means that demand changes in equal proportion to changes in price. Inelastic demand is defined as a value of less than 1, and elastic demand is a value of greater than 1. An elasticity of 0.5 means that quantity demanded changes only half as much proportionally as the price, while an elasticity of 1.5 means that demand changes 50% more proportionally than the price.

The price elasticity of demand for various products can be measured by examining historical data. Economists have studied and published price elasticities for various commodities in different countries. A list of publications summarizing the results of this research is included at the end of this chapter.

Generally, demand for luxury goods and essential food products is relatively price inelastic. People who can afford to pay for luxury goods are not very sensitive to the price when few close substitutes exist (quality gemstones, pleasure craft, etc.) The demand for essential foodstuffs is also usually inelastic since people generally buy them even if the price goes up. In contrast, many consumer goods have a high elasticity, since people can easily find substitutes or do without them.

Consider another intuitive way to think about price elasticities of demand. Suppose you spend 10% of your income on a certain product. If the price of this product falls, you buy more, but do you buy so much more that the fraction of your total income spent on the product increases, or just a little bit more, so that the fraction of income spent on that product falls under 10 percent? In the first case, demand would be elastic, in the second, inelastic. Clearly in the case of food, the “savings” from a fall in the price of food would not be spent only on additional food, with the exception of those consumers well below the poverty line. Lower airfares, however, might cause a business traveler to take the whole family on a future business trip, increasing the fraction of income devoted to airfare.

For trade policy purposes we want to measure the impact of a change in the price of an imported product on the demand for that product. To be precise, what we need is the import price elasticity of demand. The response of consumers to a change in the price of an imported product is affected by a number of things, including the overall desire of consumers to buy more of a particular type of product when its price falls, the extent to which consumers are willing to substitute imported goods

or services for domestically produced substitutes, and the willingness and ability of domestic producers to change their prices. The price elasticity of demand captures consumers' responsiveness holding all other factors constant, including the response of domestic producers mentioned above, as well as income and the prices of substitutes and complements.

Typical estimates of such import price elasticities are found in the table below, based on a survey by Robert Stern, an international economist, in 1976. These estimates were derived by scouring the published work of economists across a broad range of countries. Industry definitions used for this purpose are from the Standard International Trade Classification system, which is widely used internationally. Stern published values for all the major countries in his book *Price Elasticities in International Trade*.

Table 3–1 Typical Import Price Elasticities

Industry Category	Range	Median
SITC 0 & 1 (Food, Beverages and Tobacco)	–0.09 to –1.59	–0.78
SITC 2 & 4 (Crude Materials; Oils & Fats)	–0.17 to –1.15	–0.50
SITCS 3 (Mineral Fuels)	–0.01 to –2.78	–0.96
SITC 5 – 9 (Manufactured Goods)	–0.74 to –2.64	–1.34
SITC 0 – 9 (Total Imports)	–0.42 to –1.37	–1.06

To summarize, the impact of a policy on trade can be measured by estimating first the impact of that measure on the price of the imported product in the import market, then multiplying that percentage change in price by a price elasticity, which measures the consumer response to a change in price. One can estimate the impact of a change in foreign trade barriers on domestic exports in the same way, with the additional step of assuming (unless clearly inappropriate) that the share of the increased imports captured by domestic exporters is the same as their current market share.

The Stern elasticities, however, are for commodity groups so large as to make them of limited use to policymakers. For example, the extreme range for mineral fuels (from 0.01 to 2.78) runs from extremely inelastic to quite elastic. Using the median of 0.96 would be a large mistake either way.

The next section of this chapter provides a more technical treatment of elasticities for those familiar and comfortable with basic economic terminology, followed by case studies and simulations.

ELASTICITIES AND THEIR USES IN TRADE POLICY ANALYSIS

Demand and supply elasticities are important in constructing estimates for the impact of policy changes on output, employment and profits. We cover the three types of demand elasticities first, then the price elasticity of supply.

Own Price Elasticity of Demand

This is often called simply the price elasticity of demand, and it refers to how much the quantity demanded adjusts to a change in price. Specifically, it relates the percentage change in the quantity demanded to the percentage change in the price of that good or service.

$$\text{Price Elasticity of Demand} = \text{Percent Change } Q_d / \text{Percent Change } P$$

$$\text{PED} = \% \Delta Q_d / \% \Delta P$$

In theory, PED can take values between zero and (negative) infinity. A value of 0 means that the quantity demanded is unaffected by changes in price. This unusual situation is called perfectly inelastic demand. An insulin user, for instance, requires a certain dosage per day, and will not change that dosage in response to higher or lower prices. A value near infinity would mean that a one penny cut in price would give you the entire market, while a one penny increase in price would send demand to zero. This equally unusual case is called perfectly elastic demand. Because of differences in tastes among individuals, there are no two goods that are perfect substitutes for everyone, and thus no example of perfectly elastic demand. For instance, we consider four quarters and one dollar bill to be perfect substitutes, yet a service has sprung up in supermarkets in which a five percent fee is charged for turning change into paper money or store credit! However, in practice, the values used in policy analysis range from 0.1 to 10.

Goods and services with price elasticities between zero and one are called inelastic, indicating that a given percent change in price leads to a less than proportional change in demand. Examples of goods with inelastic demand include oil, most types of food, tobacco, alcoholic beverages, and medicines. As a mnemonic device, think of demand that doesn't stretch or change much in response to price changes.

Goods and services with price elasticities greater than one are called elastic. Like a rubber band, the quantity demanded for these goods changes proportionately more than price, usually due in part to the ready availability of substitutes. Examples of goods that are "price sensitive" or elastic include furniture, autos, and intermediate goods like steel. To summarize and review:

0	(-)1	(-)infinity
Perfectly Inelastic	Inelastic	Elastic Perfectly Elastic

Table 3–2 gives price elasticities for some typical products. Note that long run elasticities are always substantially higher than short run elasticities. In this context, the long run usually means a period greater than three years and the short run usually means a period of less than a year.

The reason long run elasticities are higher is that over time, more adjustments take place. For example, immediately after the oil price shock of 1973 the US trade deficit sharply increased as Americans paid much more for almost the same amount of oil. Over time, consumers chose to purchase more fuel efficient cars and insulated their homes. As more time passed, energy efficient appliances were developed, new homes were built with energy efficiency in mind, and eventually consumers modified their behavior. So, conservation *can* be part of the answer to price increases and capacity constraints in the long run!

Table 3–2 Estimated Price Elasticity of Demand

Item	Short Run	Long Run
Airline travel	0.1	2.4
Medical care	0.3	0.9
Automobile tires	0.9	1.2
Stationary	0.5	0.6
Gasoline	0.2	0.7
Housing	0.3	1.9
Automobiles	1.9	2.2
Movies	0.9	3.7
Jewelry and watches	0.4	0.7

Radio and TV repair	0.5	3.8
Foreign travel	0.1	1.8
Housewares	1.5	2.5

Source: R.J. Carbaugh, Contemporary Economics, 2001. Carbaugh cites 1970 and 1980 journal articles as his sources. In other words, contemporary sources for elasticities, even for the US, are hard to find.

When you cannot obtain a reliable estimate for the price elasticity of a particular product, you may have to use the range of elasticities calculated for similar products. Issues and problems surrounding the use of elasticities in policy analysis are introduced at the end of this chapter.

Import Price Elasticity

Trade policies impact prices, either directly, when a change in tariff levels raises or lowers the price of imported goods, or indirectly when changes in import quotas increase or decrease the permitted level of imports. Let's look at two quick examples, using elasticities to calculate the impact of trade policy changes on prices and quantities demanded. Again we are assuming a small country facing a fixed world price, with competitive markets and homogeneous products. Thus pass through is complete.

The trade policy action we analyze first is an increase in India's tariff on milk powder imports from 20 percent to 50 percent.¹¹ Suppose that there is no quality difference between domestic and foreign milk powder, and there are many foreign suppliers.¹² With a 20 percent tariff, a \$10 case of milk powder on the world market would sell for \$12 in India.

$$\text{Domestic Price} = \text{World Price} * (1 + \text{Ad Valorem Tariff Rate})$$

$$P_d = P_w * (1+t)$$

$$\text{Domestic Price} = \text{World Price} + \text{Specific Tariff}$$

$$P_d = P_w + t_s$$

Therefore in our example P_d (domestic price) = $P_w * (1+t) = \$10 * 1.2 = \12 .

Domestic producers would match this price, since demand for their milk powder is very elastic; at a price higher than \$12 for the domestic product, consumers would buy the import instead.¹³ A 50 percent tariff would increase the domestic price of both the domestic and imported product to \$15, an increase of 25%. If the price elasticity of demand for all milk powder is 0.6, then how much will demand decrease as prices rise?

¹¹ Actually, the tariff increased from 15% to 60% on imports over 10,000 tons. See Financial Times, April 25, 2000.

¹² In reality, the tariff was meant to protect fresh milk producers in India, but considering the case in those terms requires the more sophisticated tools of the appendix to chapter four.

¹³ For a number of commodities, we can assume that the import and the domestic product are perfect substitutes, and thus will sell at the same price. But this is not true for differentiated manufactures goods, where quality variations and branding make prices different. The simple model shown below will not be appropriate in the case of differential products, and a more complex model appropriate for those situations is introduced in Appendix 4-1.

Since the price elasticity of demand is equal to the percent change in quantity demanded divided by the percent change in price, the percent change in demand is equal to the price elasticity of demand times the percent change in price.

$$\% \Delta Q = PED * \% \Delta P$$

Hence we have $-0.6 * 25\% = -15\%$. So if the tariff is raised from 20% to 50%, total demand for and consumption of milk products in India falls by about 15%.

Now suppose instead of the tariff, the Indian government elects to use a quota to limit milk powder imports. If total consumption before the quota is 100 tons, and the new quota limits imports to whatever is required over domestic production to reach a total of 85 tons, a 15% fall in total supply results.¹⁴ Under these simplifying assumptions, we calculate a fall in total demand of 15% and, with the same price elasticity of negative 0.6, we get the same price rise of 25 percent. In other words, a 15-ton reduction in the import quota would have the same effect as an increase in the import duty from 20% to 50%.

For “visual” people, let us view elasticities diagrammatically. This will show how the concept of elasticity is fundamentally different from the concept of slope. The following straight-line demand curve has a slope of $-1/10$ (the quantity demanded increases by 10 for each \$1 decrease in price, see Figure 3–1). Yet, as the following diagrams illustrate, the price elasticity of demand changes along the line. Demand is inelastic at low prices and large quantities, where the same change in quantity over a high base is a small percentage change and the same change in price is a larger percentage change. At high prices and small quantities, demand is elastic.

We also see in Figures 3–2 to 3–5 the relationship between elasticity and total revenue. Price increases lead to higher total revenue and higher profits when demand is inelastic (Figures 3–3 and 3–4), while price increases lead to lower total revenue, but not necessarily lower profits, when demand is elastic (Figure 3–5).

¹⁴ In addition to the assumptions above, we now must assume that the domestic market is competitive, and price rises freely to make demand equal total supply. In the real world, calculating the impact of a quota is much more difficult, hence quotas may be used in part to “disguise” the full impact of protection.

DEMAND AND ELASTICITIES: A VISUAL APPROACH

Figure 3-1 Hypothetical Demand Curve

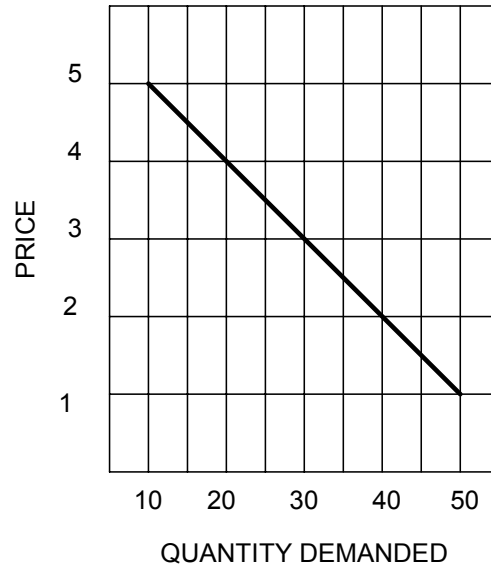


Figure 3-2 Hypothetical Demand Curve Showing Total Revenue When $P=\$1$ and $Q=50$

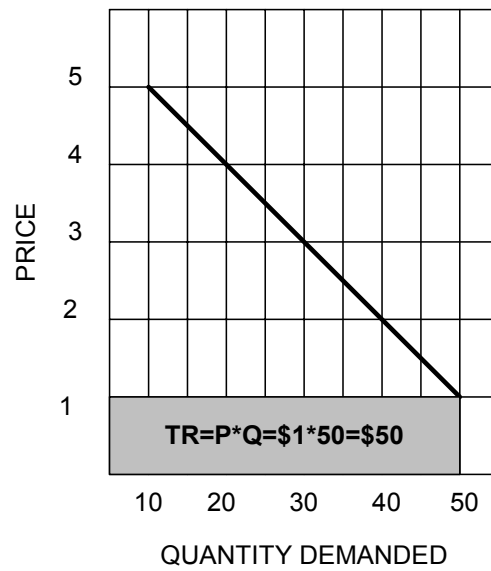
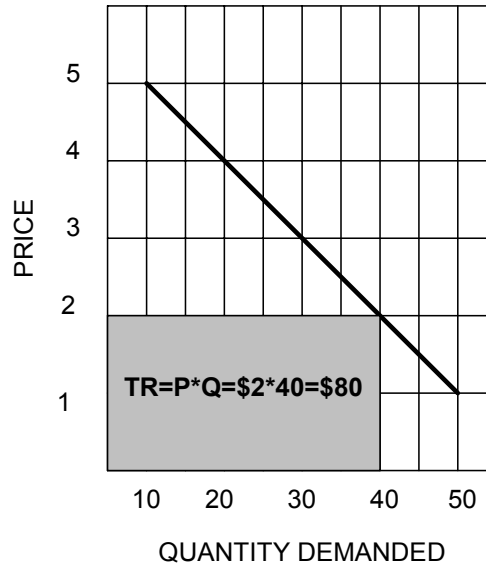


Figure 3-3 Hypothetical Demand Curve Showing Total Revenue if price is raised to \$2

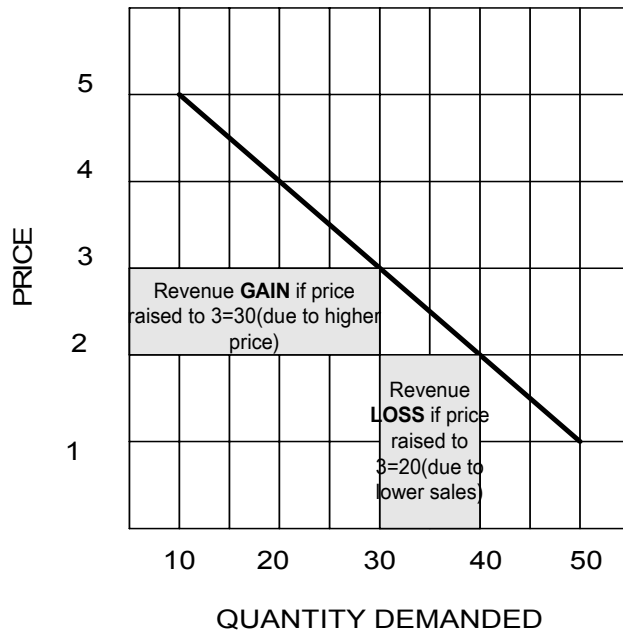


Percent Change in Quantity: $(50-40)/50 = 20\%$

Percent Change in Price: $(\$2-\$1)/\$1 = 100\%$

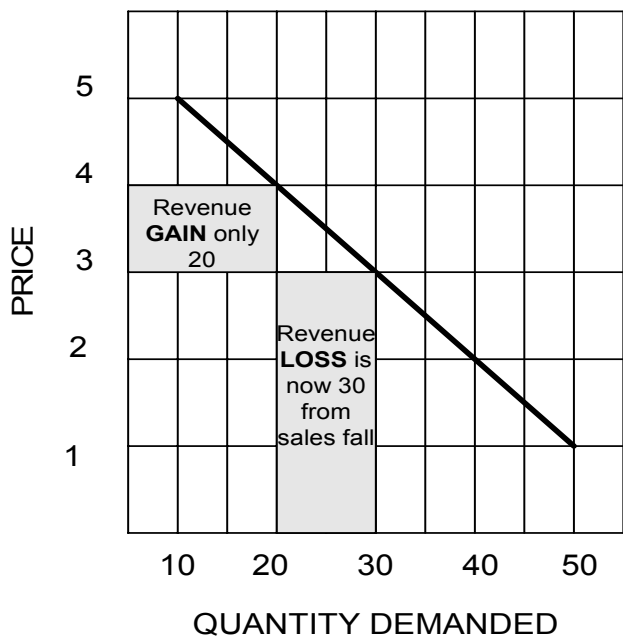
Price Elasticity of Demand: $(20\% / 100\%) = 0.2 \Rightarrow$ Demand is inelastic.

Figure 3-4 Hypothetical Demand Curve, Illustrating that Demand is still inelastic if price is raised to \$3



Is demand still inelastic if price is raised to \$3? YES. Total revenue can be increased from \$80 to \$90 ($TR=P * Q= \$3*30$) by raising price, thus demand is still inelastic at $P =\$2$ and $Q=40$. The two rectangles above show how much total revenue is **increased** by getting a dollar more for each of the 30 units sold, compared to the 420 of **lost** revenue from losing 10 units of sales at \$2.

Figure 3-5 Demand becomes more elastic as price is raised along a linear demand curve



Percent change in price is now 33.3%. Percent change in Q now 33.3%. Total revenue falls from 90 to 80. A monopolist would never charge a price under \$3, never sell more than 30 units, and thus would never operate on the inelastic portion of the demand curve.

We have seen that the basic formula for calculating the price elasticity of demand from percentage change in price and percentage change in quantity can also be used to calculate either percentage change in price or percentage change in quantity, if you have the other two variables. Now we move to a second type of demand elasticity.

Cross-Price Elasticity of Demand

Often there is no exactly identical domestic product corresponding to an imported product. Hence a different tool must be used to relate changes in the market for the imported good, as a result of actual or proposed trade policy changes, to adjustments in the related domestic markets. The *cross-price elasticity of demand* (cross elasticity, for short) relates the percentage change in quantity demanded for a product with the percentage change in the price of another product.

Cross Price Elasticity of Demand = Percent Change in Quantity Demanded of Good “a”/ Percent Change in Price of Good “b”

$$CPED = \% \Delta Q_a / \% \Delta P_b$$

The cross-price elasticity can be positive or negative, depending on whether we observe a change in the price of a substitute or a complement. Substitutes are goods or services that can be used in place of one another (substituted), such as bread, rice, or pasta, coffee or tea, brand names or generic substitutes, etc. Using the conjunction “or” between them indicates that you use one or the other, and that a fall in the price of one good would encourage more people to use that good, and reduce demand for the substitute. For instance, trade policies that raise the price of rice in Japan have caused the younger generation to consume much more bread and pasta than their parents and grandparents. Thus the cross-price elasticity between bread and rice is positive, and the goods are substitutes.

Complements are goods that are usually consumed in combination or in conjunction with each other, such as peanut butter and jelly, bacon and eggs, autos and gas, cereal and milk, new homes, furniture, and appliances, etc. The conjunction “and” is used to indicate that consumption of the two goods should increase or decrease together. This leads to a negative cross-price elasticity, since a rise in the price of milk will lead to a fall in the consumption of cereal, since the cost of consuming “cereal and milk” has risen, even though the price of cereal remains the same.

Note that unrelated goods can act like substitutes through the impact of price changes on total disposable income. For instance, we may observe negative cross-price elasticity between pizzas and gasoline, since a rise in the price of gas leaves less disposable income to use for things like pizza.

CPED < 0	CPED=0	CPED > 0
Products are complements	Products are unrelated	Products are substitutes

Income Elasticity of Demand

Another useful concept for trade policy analysis is the *income elasticity of demand*.

The percentage change in demand for a good divided by the percentage change in income is the income elasticity of demand. In equation form, we write:

Income elasticity of demand = Percent Change in Quantity / Percent Change in Income

$$YED = \% \Delta Q / \% \Delta Y$$

As disposable (after tax) income rises, demand for most goods increases. Goods for which demand *falls* as income rises are called *inferior* goods. These inferior goods have negative income elasticities, and include things like bus rides and low-end brands of everyday goods.

Goods and services with income elasticities between zero and one (demand increases, but by a smaller percentage than the increase in income) are called *normal* goods. Food (excluding restaurant meals), especially in high income countries like the US, clothing, alcoholic beverages, and newspapers are examples of goods for which a rise in income generates little additional consumption.

Goods and services with income elasticities above one are called *superior* or *luxury* goods. Examples of these goods on which people spend a large portion of any increase in income include air travel, restaurant meals, movies, and other entertainment.

YED < 0	0 < YED < 1	YED > 1
Inferior Goods	Normal Goods	Superior (or luxury) Goods

For most countries the income elasticity of demand for imports is higher than one because, as we discussed earlier, when people feel wealthier they are more inclined to buy more expensive foreign goods that might be more attractive, or just different. The income elasticity tends to vary with the stage of a country's development. The richer the country, the higher is its tendency to buy foreign goods and services when its income rises. For countries at the bottom of the development ladder, the income elasticity might be less than one because growth might be associated with an increased capacity to produce goods at home. Also, domestic consumers use their added income to consume more basic needs such as food, clothing, and shelter, which in most poor countries are primarily produced domestically. Some typical income elasticities are found in Table 3–3.

Table 3–3 Some Income Elasticities of Demand in the United States

Product	Long Run Elasticity
Movies	3.41
Homes (purchase)	2.45
Non-durable toys	2.01
Electricity	1.92
Restaurant Meals	1.61
New and used cars	1.07
Tobacco products	0.86

Homewares	0.77
Alcoholic beverages	0.62
Water	0.59
Furniture	0.53
Clothing	0.51

Source: H.S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States*, (Cambridge, Mass: Harvard U. Press, 1970), reprinted in Joseph Stiglitz, *Principles of Microeconomics*, (New York: W. W. Norton & Co., 1993). Note again that in 1993, the best available study was dated 1970!

Note that a large fraction of an increase in income goes to discretionary purchases or “luxuries,” while “necessities” like dishes, furniture, water, and clothing show only a modest increase in demand. With a more detailed breakdown, we might see that French wines and champagnes, Cuban cigars, and Asian teak tables show a higher income elasticity within those broad categories.

Price Elasticity of Supply

The *price elasticity of supply* (hereafter just ‘elasticity of supply’) measures the percentage change in production in response to a given percentage change in price.

$$\text{Price Elasticity of Supply} = \text{Percent Change } Q_s / \text{Percent Change } P$$

$$\text{PES} = \% \Delta Q_s / \% \Delta P$$

This supply elasticity can vary from zero (perfectly inelastic supply) to infinity (perfectly elastic supply). A few examples of perfectly inelastic supply do exist. Rembrandt will not be doing any more paintings, and there are probably no more hidden away in European attics to be discovered. Perfectly inelasticity is also a useful approximation for some supplies in the very short run, especially for produce, where the amount you harvest is closely related to the area you plant.¹⁵ At the other extreme, supply can be nearly perfectly elastic, even in the short run, up to some capacity constraint, for things like phone calls, internet access, and water.

Elasticities in the Long Run

In general, supply is more elastic the longer the time horizon under consideration. In the short run, existing workers can be asked to work more overtime, which may raise your cost significantly (subject to local labor laws regarding allowable overtime amounts and compensation). In the long run, more employees can be trained and more machinery installed to produce additional output at a lower cost. Hence a permanent price increase may yield little additional supply right away, but over time the supply increase will be greater and the price increase smaller than it was initially. Thus the supply elasticity is greater in the long run. For example, NAFTA gave Mexican producers greater access to the US market in important areas like garments, textiles, and sugar. Mexico responded with

¹⁵ Even then, more intensive cultivation methods can be used to increase yields if prices are rising, while some output could be withheld from the market and stored if prices fall below expectations.

an increase in exports to the US, but there was even greater growth in new investment in these areas, creating more capacity and even larger export increases in later years.

In general terms, the long run is a period of time over which all costs are variable. In contrast, the short term is a period of time over which some costs are fixed. Returning to the oil shock analogy from page 24, increased oil exploration led to major discoveries in Alaska and the North Atlantic. More was invested in the development of alternative energy sources such as wind, solar, and atomic energy. All these factors combined to increase the supply of alternatives to OPEC oil over time, raising the elasticity of supply in the broader “energy sector” in the long run.

Some Cautions When Using Elasticities

Estimated elasticities are only “correct” for a specific context. If you try to apply them outside that context, your calculations may be poor estimates of the actual changes. The list below may be helpful.

Problem 1: Old elasticity estimates.

Danger: Changes in tastes, new products, etc. may have changed elasticities, making them incorrect.

Solution: Develop familiarity with data sources to find the most current estimates possible. Use *sensitivity analysis* to present a reasonable range of estimates.

Sensitivity analysis tests the robustness of these economic models and their conclusions by varying some of the key assumptions and seeing how the conclusions change under these different assumptions.¹⁶

Problem 2: Large price changes.

Danger: Elasticity estimates are based on historical ranges of variation, and are generally valid only for small changes around a certain point on the demand curve. As we saw earlier, elasticities may change substantially for movements along a demand curve, thus estimates of changes in quantity demanded (price) derived using large (greater than 33%) price (quantity) changes may be unacceptably incorrect.

Solution: There is no generally valid solution. In some cases you will overstate the actual change; in others you will understate it. For instance, a material such as aluminum has many potential uses, and is widely used if it is cheap. As its price rises, people will use plastic wrap instead of aluminum foil, but airplane manufacturers will continue to use aluminum, because of its desirable weight to strength ratio, even when the price rises substantially.¹⁷ Hence one might use a smaller PED for large price increases and a larger one for large price decreases. But other products have the opposite characteristics.

Thus understanding the particular product and market is necessary. Use sensitivity analysis to present a reasonable range of estimates, understanding that the honest approach is to expand the range of sensitivity analysis to reflect this additional source of uncertainty.

Problem 3: Cannot find an estimated elasticity for the particular product or service you need to analyze.

Danger: Use of a broader or narrower category can greatly change the appropriate elasticity, making your estimates incorrect.

¹⁶ For a detailed discussion of sensitivity analysis and examples of its use, see the corresponding section in Chapter 9.

¹⁷ Stiglitz, *Principles of Microeconomics*, New York: W.W. Norton, 1993 p.112.

Solution: Understand that narrower categories generally have higher elasticities, while broader categories have lower elasticities, because they already contain most close substitutes. For instance, the elasticity of demand for restaurant meals is over 2, while that for all food is about 0.6.¹⁸ Use sensitivity analysis to present a reasonable range of estimates.

Problem 4: Need long-run estimates but have only short-run, or vice versa.

Danger: Long-run and short-run elasticities can be very different, as shown in Table 3–2.

Solution: Understand that elasticities are greater in the long-run than the short-run, and can be much greater. Inflate or deflate the elasticity estimate appropriately, noting that the ratio of long-run to short-run elasticities in Table 3-2 vary by sector from 1.6 to over 20. Use sensitivity analysis to present a reasonable range of estimates.

Problem 5: Estimating your own elasticities from historical data.

Danger: To do this correctly, you must hold constant all other potential factors affecting supply and demand, such as income, prices of other goods, production costs, etc.

Solution: Unless you have excellent econometric skills, you are better off presenting a plausible, round-number estimate, with sensitivity analysis. Remember that a shift in the supply curve means a movement along the demand curve, and vice versa.

Problem 6: Using estimates from advanced industrial countries for developing countries

Danger: The chances of the exact elasticities you need being available for Thailand or Namibia are very low, hence you will be tempted to use more readily available elasticities for industrial countries in Europe or North America.

Solution: More hard work! Step one is to search for specific information on the relevant sector and country. Step two could be to look at the same sector in “similar” countries (determining the degree of similarity is another potential problem). Using elasticities from industrial countries should be the last resort, and one should think carefully about how the market situation in the developing country you are studying suggests modifications of the elasticities.

Finding Elasticity Estimates

Typically, government agencies do not regularly compute such estimates. Often the only way to find elasticity estimates for detailed industrial categories is to survey economic research. Fortunately, you needn’t always conduct the survey yourself, if you are working on a “hot” issue area. Computable or applied general equilibrium modelers are the leading users of such data, so if a reasonably unbiased empirical model of this issue exists, the authors have undoubtedly done such a survey already, and

¹⁸ Ibid.

should make that information available to you.¹⁹ The *Journal of Economic Literature* is one source of reviews of such models.

Regional journals, such as the *North American Journal of Trade and Finance*, *Asian Economic Journal*, etc., are good sources for trade-related elasticities germane to current or proposed trade agreements. Finally, collections of papers from conferences devoted to either CGE modeling in general or topic areas in particular can be excellent sources of elasticity data, or at least good starting points for your search.

Several recent books and articles are devoted to international demand elasticities:

The Demand for Imports and Exports in the World Economy, W.C. Sawyer and R.L. Sprinkle, Ashgate Publishing 1999.

“Long-Run Industry-Level Estimates of US Armington Elasticities,” by M. Gallaway, C. McDaniel, and S. Rivera, USITC working Paper #2000-09a, (October 2000), (available on-line at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=249027).

The second paper makes two important points. The first is that a decent rule of thumb for converting short-run to long-run elasticities is to multiply by two. The second is that long-run elasticities for different products vary greatly, even under the same broad industrial classification.

¹⁹ Some current leaders in data-intensive CGE modeling are Alan Deardorff and Robert Stern (and many of their former students at the University of Michigan, now spread around the world), Jaime De Melo (and other current and former World Bank researchers), Joseph Fracis (and other current and former researchers at the US ITC), Lawrence Goulder (and other former students of John Shoven at Stanford University), Thomas Hertel (GTAP – Purdue University, Department of Agricultural Economics), Sherman Robinson (and others he has trained at UC Berkeley, the USDA, and IFPRI), John Whalley (and his students from Western Ontario), and B. Hockman.

APPENDIX ELASTICITY POLICY CASES AND A NEW CALCULATION METHOD

In Chapter 3, we present arguments for both an elastic demand and an inelastic demand for luxury goods. On the one hand, rich people do not have to be as concerned with their budgets as poorer people do. Thus, they may respond to an increase in the price of a luxury good by purchasing nearly the same amount at the higher price. On the other hand, the demand for luxury goods may be price elastic, compared to so-called necessities, since postponing their purchase causes little hardship for the buyers. Which effect dominates, in practice?

In 1990, the democratic-controlled Congress of the US passed a luxury tax on yachts, furs, jewelry, private jets, and luxury cars. Their logic was twofold: hit the rich with a greater share of the tax burden, and generate plenty of new revenue, since demand for such luxury items is price inelastic. Taxes on inelastic items are the most efficient way to raise revenues, since little distortion of consumption takes place. In other words, with very inelastic demand (picture a very steep demand curve), there is little change in consumption in response to the higher price, thus the deadweight social loss triangle associated with the distortion has a very small base, and a small area. See the illustrations below, and the detailed discussion of the concept of deadweight social loss in Chapter 7.

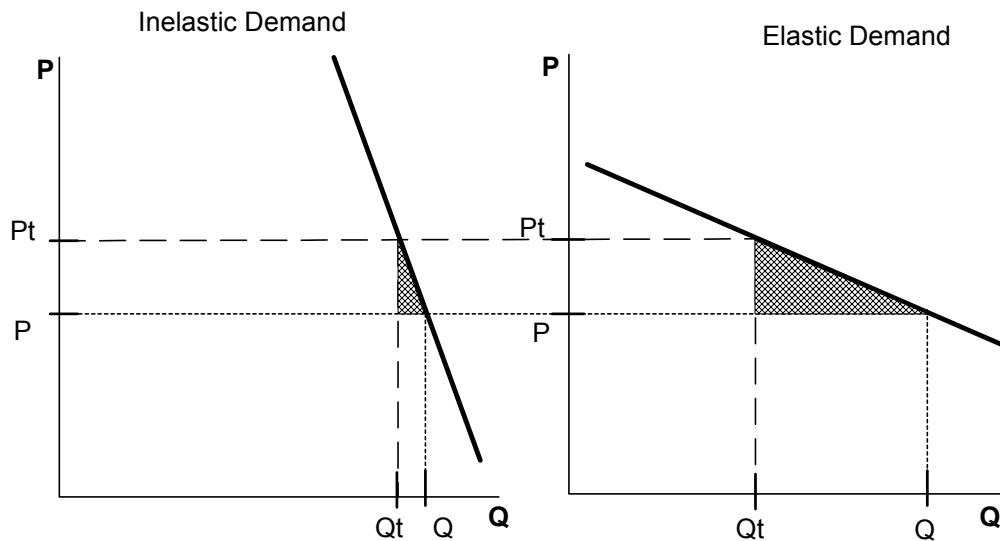


Figure A3-1 Illustration of Impacts of a tax on inelastic and elastic markets

Many products with inelastic demand, which are heavily taxed at present, have a regressive impact, i.e., poor people pay a disproportionate share of the tax burden. Poor people spend a greater fraction of their income on cigarettes, liquor, and gasoline than do the rich. They pay a greater share of those “sin” taxes. (Is driving a car to work alone really a sin? Well, it certainly isn’t a virtue!).

Congress believed this luxury tax represented a chance to hit the rich for at least their fair share, a move likely popular with their core constituencies, including organized labor. Congress was dead wrong! Demand for luxury items was much more elastic that they had believed, for several important reasons. First, there are many ways to spend an extra \$100,000 or so to increase happiness, besides buying a yacht or Rolls Royce. Secondly, a yacht, in particular can be purchased off-shore and tax-free in the South Pacific or Caribbean Islands, which is where many rich people do their yachting

anyway. Sales of yachts in Florida fell by almost 90 percent. Congress had not considered that yachts purchased abroad could be close substitutes for yachts purchased domestically. Thirdly, many rich people treated the tax as a temporary price hike, and delayed purchases while lobbying behind the scenes to repeal the tax.

Congress soon faced another problem. The buyers of yachts and private planes may be rich, but the *workers who make them* are part of the Democratic Party's core constituency. As orders dropped sharply, so did employment of unionized production workers in the factories for some of these luxury goods. Complaints from these workers were the last straw for Congress, which already faced revenues well below projections (\$1.5 billion dollars of revenue was expected over the first five years of the tax) and pressure from rich campaign contributors. The tax was repealed after less than a year. Note that purchases of some of these luxuries surged above pre-tax levels immediately after the repeal!²⁰

The example above shows two dangers. Obviously, *basing a policy on a faulty estimate of an important elasticity will get you in trouble*. But *applying closed economy thinking to an increasingly open economy* is an even greater and more insidious danger.

Let us consider one more example, briefly. In the early 1980s, Canada imposed additional national taxes on cigarettes. These taxes added a total of \$3 (Canadian) to the cost per pack. The government's logic here was twofold. They hoped to raise revenues, since adult smokers have an inelastic demand for cigarettes. They also hoped to deter new smokers, particularly teens, with the higher prices.

Sales plummeted. Had the government incorrectly estimated the price elasticity of demand for cigarettes in Canada? Soon it became obvious that smoking was not falling nearly as much as the sales figures indicated. Cross border sales in the US, particularly unregulated and untaxed sales on border Indian reservations, were booming. Canada accused US tobacco companies of orchestrating (or at least facilitating) these sales, and sued for the lost tax revenues. At the end of this section, we will do a quick, back of the envelop estimate of how much Canada should be compensated for this smuggling, assuming the courts found in Canada's favor.

What followed, to the present, is a classic case of inability to coordinate policies across national borders. Canada appealed to the US to raise its taxes (which had declined from 42 percent of the price of a pack in 1951 to just 15 percent by the late 1980s), and/or police border smuggling.²¹ The US refused. After a decade of struggling with smuggling from the US, compounded by the involvement of indigenous peoples and, arguably, the US tobacco industry, Canada repealed most of the tax in 1994, bringing cigarette prices back into line with the US. Some western provinces instituted their own taxes at that time, however, to avoid a consumer price fall. Now state lawsuits in the US are being settled with provisions for sharp increases in taxes on cigarettes, with the proceeds to fund education efforts to prevent teen smoking. Prices in the US rose by nearly a third in 1998, with US prices higher than those in the two most populous Canadian provinces of Ontario and Quebec. Now Detroit shoppers are loading up on cigarettes in Windsor, Canada! Canadian groups are calling for an increase in the cigarette tax in Canada, citing a loss of \$1.98 billion in revenues by the provinces that rolled back the tax in 1994.²²

²⁰ Some of the numbers for this case are drawn from Carbaugh, Contemporary Economics, College Publishing. 2000. p.79.

²¹ Stiglitz, Principles of Microeconomics, New Your: W.W. Norton, 1993, p.374.

²² For additional information on this case, see <http://www.newswire.ca/releases/October1999/25/c6895.html>

Typically, non-economists estimate tax revenues lost by implicitly assuming a price elasticity of demand of zero (perfectly inelastic demand). Thus, the \$2 billion estimate above is probably based on a \$2.50 per pack tax times current sales of 800 million packs per year. Even though this tax would roughly double the price of a pack of cigarettes, they assume no decrease in demand. But even with an inelastic long run demand elasticity of 0.75, the actual loss in revenue is much lower, as shown below. Note that this big proposed change in price means that we need to introduce the more sophisticated method of “arc elasticity,” described below. A rule of thumb is that you can use the normal method of calculating percentage changes in price and quantity, as long as the changes are less than 25%, and be confident that the error from this simplification is about 10% or less. If the change you calculate is one-third or greater, you should use the more complex arc elasticity to avoid errors that are 20% or greater.

The logic behind arc elasticity is simple. Why should an increase from 1 to 2 be a 100% increase, while the decrease from 2 to 1 is just a 50% fall? Suppose a firm sells 1000 units at \$1, and raises the price to \$2. If the price elasticity of demand is (-0.7) , we would predict a fall in sales to 300 units. Now suppose the firm cuts its price back to \$1. Naturally, sales will return to 1000 units at the new equilibrium. But, using our simple methodology, we would predict an increase from 300 units to $300 * (50\% * 0.7 + 1)$ or just 405 units! This amount of error is unacceptable.

With the arc elasticity, we divide the change in price or quantity by the *average* price or quantity to compute the percent change.

$$[\% \text{ change} = (P_{\text{new}} - P_{\text{old}}) / [(P_{\text{new}} + P_{\text{old}}) / 2].$$

Thus the increase in price from 1 to 2 and the decrease in price from 2 to 1 are both 67% changes $[1/(3/2) = 2/3]$. Sales would initially drop by $0.7 * 2/3 = 46.7\%$, then rise by the same amount back to 1000 when the price falls back to \$1. The trickiest part of using arc elasticities is not calculating the change in price, but in calculating the new quantity. If we reduced 1000 to 533, then a 46.7% increase would clearly not raise it back to 1000.

The formula for Q_{new} is $Q_{\text{old}} * (2 + \% \text{change}) / (2 - \% \text{change})$.

Note first that if $\% \text{change} = 0$, $Q_{\text{new}} = Q_{\text{old}} * 2/2 = Q_{\text{old}}$. That is good. In our case, we have first a 46.7% decrease in Q. Thus $Q_{\text{new}} = 1000 * (2 + -0.467) / (2 - -0.467) = 1000 * 1.533 / 2.467 = 1000 * 0.621 = 621$. When the price falls, the new quantity will be $Q_{\text{new}} = 621 * 2.467 / 1.533 = 621 * 1.61 = 1000$ (actually 999.8, with rounding errors, but that is a whole lot better than the other method). This is a more complex calculation, so we recommend that you:

Use it only when the increased accuracy is worth the effort (when you estimate a change in P or Q of greater than 1/3 by the simple method).

Check you work more carefully, especially checking first to make sure that you predict a fall in Q when P rises and vice versa!

Packs sold without tax = \$2 billion / \$2.50 per pack = 800 million packs. With the tax, the \$2.50 increase in price to \$5.00 is, in arc terms, an increase of $(P_{\text{new}} - P_{\text{old}}) / P_{\text{average}}$, or $\$2.50 / \$3.75 = 67$ percent.

Recall from before that we are assuming a long-run elasticity of 0.75. This means that the price change will reduce demand by $0.75 = (\% \text{ change in quantity demanded}) / 67\%$, thus $\% \text{ change in quantity demanded} = 0.75 * 67 = \text{about } 50$ percent.

Operationalizing the 50 percent decrease, in arc terms, means that

$(D_{\text{new}} - D_{\text{old}}) / D_{\text{average}} = 50\%$. If $D_{\text{old}} = 800$ million, we use our formula

$D_{\text{new}} = D_{\text{old}} * (2 - x) / (2 + x)$, where $x = \%$ change in demand.

Here, $(2 - 0.5) / (2 + 0.5) = 1.5 / 2.5 = 0.6$. 800 million packs times 0.6 equals 480 million.²³ If sales fall to 480 million, then tax revenues would be just 480 million times \$2.50 = \$1.2 billion. If the tax increase again makes US cigarettes an attractive option for Canadian smokers, the public health benefits will lessen, and the tax revenues will decrease as well. Hence a “reasonable” compensation to request from the US tobacco companies, *if* it is found that they conspired to funnel cheap cigarettes to Canada, is around \$1.2 billion per year less actual taxes collected in those years.

²³ Notice how large a mistake you would be making if you took the change in price as 100%, calculated as a 75% reduction in demand, and applied that reduction to sales, estimating sales after the tax of just 200 million packs.

CHAPTER 4 ESTIMATING THE IMPACT OF POLICY ACTIONS AFFECTING TRADE ON INDUSTRY REVENUES, COSTS, AND PROFITS

In the last chapter we explored how policy actions change trade flows by affecting the cost and price of traded goods, or affect prices by changing trade flows directly. Information on the impact on trade flows still does not tell us, however, how the economic interests of stakeholders are affected. The focus of this chapter is the subset of stakeholders participating in the profits of firms producing goods and services domestically. To estimate these effects, we must calculate how a change in prices and trade flows translates into changes in the domestic production of goods and services, and thus on industry revenues, costs and profits.²⁴

An increase in exports will increase domestic production by an equal amount, provided the industry has unutilized production capacity or large inventories of final goods.²⁵ In some cases, we assume that the industry has the capacity to increase output. We want to estimate the change in domestic output in the industry after producers have adjusted their output to accommodate the increased export demand. We can simply add the projected increase in exports to the projected level of domestic consumption (abstracting from imports) to obtain the new, higher level of output. The argument in policy debates can be simplified still more. It is not unreasonable to de-link foreign and domestic demand, and say that the increase in output attributable to a trade policy that increases exports is simply the increase in exports. Remember that our goal is generally not to predict future sales and profits, but to isolate the impact of a proposed trade policy on sales and profits. Economists sometimes express these numbers as changes from a “baseline” or “status quo” scenario.

To calculate the impact on growth in the industry, we divide the increase in exports by the current level of output. The result tells us how much additional growth has been or will be created by the trade policy action. We can also measure the significance of the trade policy action by calculating how the growth generated by the increase in exports compares to the current growth in domestic demand or the underlying growth trend in exports.

One problem in making these calculations is the discrepancy between the commodity classification system used for trade data and the industry classification system used for production data. As discussed in Chapter 2, we either must find a concordance that allows us to map data in the trade data series to the production data series, or we simply must utilize trade and production data that provide the closest fit. One must be particularly careful not to mix levels of aggregation. Suppose a proposed trade deal will lower tariffs facing US exporters of newsprint. That will clearly boost exports and output of US pulp and paper manufacturers, but we cannot apply the estimated percent

²⁴ An import surge decreases demand, price, profits and employment for domestically produced *substitutes*, but could actually increase demand, price, profits and employment for domestically produced *complements* (goods used along with the imported good, such as Pentium processors and cheap Korean memory chips), or *service* contracts on Mexican-assembled color TV sets, transportation services associated with international trade, and sales people in Toyota dealerships.

²⁵ While varying by industry, manufacturing firms in the large industrialized economies generally run at 80-85% capacity in normal times, rising close to 100% after several years of strong economic growth (see the 2001 California energy situation) and falling as low as 60% in a sharp recession. Thus US firms may easily provide 10% more exports due to a trade agreement, but a Mexican or Central American producer might have to divert products from domestic market to increase significantly exports to the US (at least during a transition period in which new investments are made to expand production capacity), increasing both domestic and export price to meet new demand in the US unless imports are freely available.

increase in newsprint exports to the entire pulp and paper sector, which includes cardboard, printer paper, etc., as well as newsprint.

We need also consider the effect of time. In the very short term, producers may not be able to increase production because they don't have sufficient parts or raw materials on hand. Or they may not want to increase production because they first want to reduce inventory of finished products before paying overtime, hiring new workers, or installing new machines, particularly if they feel that the increase in demand may be temporary. An increase in sales satisfied through a reduction in inventories increases revenues and profits, but does not increase the level of output (and employment, the topic of the next chapter). At some later stage producers may adjust the supply chain, with inventories fallen enough to demand replenishing. At this stage the increased demand for products is translated into increased production, up to a level that can be accommodated by the production capacity. We will explore next what happens when producers reach full capacity utilization. Given enough time they can increase production capacity through more investment in plants and equipment. New firms may enter the industry, adding to total production. Over time, we should witness a sequence of three events—in the very short run a reduction in inventories, in the intermediate run an increase in output (by using existing capital and labor more intensively), and in the long run an increase in production capacity (through new capital investment, hiring and training at existing firms, and new firms entering the market).²⁶

We now need to explore what happens when producers reach production capacity limits. At this stage, producers start charging more money for their product, and if they can sell their products abroad for a higher price than in the domestic market, they may also divert sales from the domestic market to the foreign market. This chain of events increases their revenues. How much they will increase prices depends on the interaction between demand and supply in the market. How much a producer increases prices as compared to increasing production depends on the producer's cost structure and competitiveness, and the culture of the industry. Industries may be quicker to expand output where economies of scale exist (increasing production capacity allows costs to decline). Competitive pressures discourage price increases, and corporate culture (the main bank and Keiretsu system of Japan, for instance) encourage expansion. To estimate how the market would respond we would need to examine the past relationship between price changes and production decisions in the industry, information that is contained in the previously discussed price elasticity of supply. To determine the new equilibrium price and production level, the supply responses must then be compared to the responses of consumers (usually both industrial users and households) to changes in price using the price elasticity of demand we reviewed in the last chapter.

There is no simple way to make these calculations. They are complex calculations with simultaneous equations that are often best left to economists.²⁷ However, we can approximate the long-run equilibrium if we assume the industries are perfectly competitive. For non-competitive industries dominated by a few firms, or characterized by large fixed costs or high barriers to entry, the methodology introduced in the next section will *understate* the *additional* profits the industry enjoys from an increase in demand for its exports (and correspondingly underestimate the *decrease* in profits for an import-competing industry faced with increased imports).

²⁶ A more complete discussion of trade and employment is postponed to the next chapter, but note that the stage at which employment increases in the three-stage process depends on the country and industry we consider. Generally employment increases in stage two, and may increase further in stage three, but in economies with flexible labor markets and industries that don't require major training efforts, the employment increase comes earlier.

²⁷ A somewhat simplified but still very challenging method is presented in the appendix to this chapter.

In political discourse, the tendency of trade advocates is to jump immediately to the long-run change in production that is generated by trade liberalization. On the other hand, opponents emphasize short-term adjustment costs. When will these benefits to domestic industry show up in the economic data? The actual length of time that corresponds to the short, intermediate and long run varies from industry to industry, according to the cyclical position of the industry at any one period of time. The inventory and capacity management practices adopted by the industry also matter. As a rule of thumb, the short run is no more than a year, and the long run is at least 3 years in the future.

This brings us to a discussion of profits. All other things being equal, we can expect industry profits to increase proportionately with the increase in sales (if profit margins are constant per unit of output) or revenues (if gross profit margins on sales are constant).²⁸ Other things may not stay the same, however. Profits are the difference between costs and revenues, and both might be affected by circumstances. We saw earlier that when producers near their capacity limits they are likely to increase their prices. An increase in the prices of goods sold will boost profits. On the other hand, costs may increase as well because the suppliers of the inputs may also reach capacity limitations, which will reduce the profits. Making these calculations is a fairly complex undertaking and not necessary for most policy discussions. It is sufficient to observe that under certain conditions favorable to the industry firms are likely to experience a surge in profits. Policy makers should be able to take advantage of those conditions in exploring policy options.

Calculating Changes in Production and Profits

The remainder of this chapter introduces the standard graphic methodology for analyzing the impact of trade policy changes on producers. The same methodology also allows us to see and calculate the benefits and costs to consumers and the government. The benefits of this methodology are that it is well known and generally accepted by economists, and is relatively simple to learn and use. If you understand supply and demand diagrams, you are halfway there.

This methodology has several drawbacks, however, making it unsuitable for some trade policy analysis questions. The underlying assumption is that domestic and foreign products in this market are perfect substitutes. Consumers will purchase the cheaper product, without regard for its national origins. Thus, there can be no real or perceived quality difference between products. The model is perfectly appropriate for homogeneous goods, like commodities (appropriately categorized by quality, such as “light, sweet Brent crude” instead of just oil, Durum wheat, Arabica coffee, etc.).²⁹ In an appendix, we discuss the more complex case in which the domestic product and the import are different varieties of the same product, such as Honda Accords and Ford Taurus.³⁰ A second problem with this methodology is that it doesn’t lend itself to generalizations about the overall impact on the country (what we call “the national welfare”), since it focuses on a single industry. We would expect there to be “upstream” and “downstream” effects on industries that sell and buy with the industry in question. We will discuss these effects later, in the context of effective rates of protection, input-output tables, and computable general equilibrium models (Chapter 9).

²⁸ Consider a firm that sells 50 units @ \$1,000 before the trade policy change, and 55 units @ \$1,100 afterwards. Profits may rise by 10% (in proportion to sales) or 21% (proportionally to revenues), or somewhere in between.

²⁹ One function of advertising is differentiating your product, making other products poorer substitutes. The makers or retailers of “Kona”, Colombian, or Jamaican coffee have created a premium for their varieties through advertising. Hence the wording “no real or perceived” difference between products, with a subtle emphasis on perceived.

³⁰ Economists call these “differentiated products,” indicating that consumers can easily tell the difference and establish preferences for either domestic or imported version of the product that will result in price differences in the marketplace.

As indicated above, we must know both the change in output and the change in price before estimating a change in profits for the industry. We also must know the change in output before we can estimate the likely change in employment, which we will do in the next chapter. What we typically know with respect to our exports is how much the cost of our product will change in the foreign market(s) as a result of a policy action. How we know this is covered in the introduction to Chapter 3. We then use the estimated change in trade flows as a first guess for the long-run increase in production of the export.

If capacity in the industry is limited, however, we must modify our estimate. If capacity utilization is high in the export industry, and the additional production for export would push it near or over 100 percent, prices and profits will rise, and output will rise less than our first guess would indicate. A rule of thumb is to use an 85–90% capacity utilization level as the turning point, with increases in demand below that level translating primarily into increased production and increases above that level resulting primarily in higher prices.³¹ In the language of economists, we can say that elasticities of supply, like those of demand, change as one moves along the supply curve. Once again, we must be careful in applying a single price elasticity to a large change in price and clearly state the time frame of the analysis.

Table 4–1 Capacity Utilization in Different Sectors.

Year	Durable	Non-Durable	Primary Processing	Advanced Processing	Utilities
1982	68.0%	77.5%	68.4%	74.0%	79.3%
1989	82.0%	85.7%	85.3%	82.7%	86.3%

Let’s turn to what happens to the output of domestic producers when the price of a competing imported product falls. We must consider how a fall in the price of imports will affect the price of the competing domestic products and consequently the demand for the domestic product. One might initially expect that an increase in imports would lead to a reduction in the price of competing domestic products, as domestic producers seek to preserve sales. However, an increase in imports is less likely to be met by a cut in the price of the domestic substitute if domestic capacity utilization rates are high than if substantial excess capacity already exists. Consider also the possibility of domestic complements, which face increased demand as the price of imports falls.

Thus we see the complexity of decomposing a given change in projected trade flows into a price and production impact for domestic producers. But once we have those estimates, with just a few more assumptions, we can calculate changes in profits. The supply curve shown in Figure 4–1 provides a graphic illustration of the impact of increased foreign demand for a country’s exports on the profits of the export industry. The diagram shows the impact of the mutual elimination of tariffs between the US and Costa Rica on export opportunities for Costa Rican garment producers. In Figure 4–1, increased demand results in both higher prices and greater output.

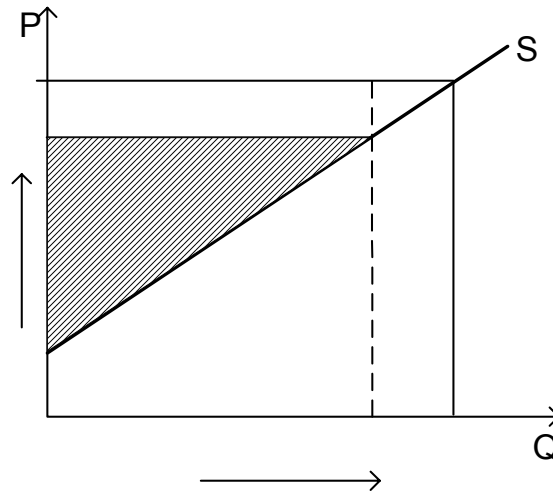
To estimate the potential impact of an action on profits, we must address what economists call *producer surplus*.

³¹ To get an idea of typical capacity utilization rates, the two lines of Table 4-1 show rates for broad categories of US industry in recession (1982) and boom (1989). There is more variation at the product level.

Producer surplus is the difference between the minimum price a producer must receive to supply that product to the market and the price actually received for that product. When the minimum price, based on the supply curve, fully reflects the marginal cost of production (additional labor, electricity, etc.) then changes in producer surplus correspond to changes in gross operating profits (before depreciation charges, interest expenses, overhead, and taxes).

The shaded triangle in Figure 4–1 represents producer surplus prior to the trade agreement. See also the more detailed discussion of producer surplus in Chapter 6.

Figure 4–1 Producer Surplus Resulting from the Elimination of Foreign Tariffs



Producer surplus clearly increases for the Costa Rican exporter, and with numbers for the Qs and Ps, we can calculate the increase. Suppose Q increases from 6,000 to 8,000 units, and P increases from \$15 to \$20 per unit.³² In this simple model, production costs increase only for the increased output. Since the exporter can charge a higher price for *all* goods sold, profits will rise by the price increase times the old quantity of sales [$\$5 * 6,000$] plus the triangular area of profits on new sales [$1/2 * \$5 * 2,000$], or \$35,000.³³ Total revenues increase from $\$15 * 6,000 = \$90,000$ to $\$20 * 8,000 = \$160,000$. The “other” \$35,000 (the difference between the increase in revenues and the increase in profits) represents increases in costs of production (wages, electricity, etc.).

The simplifying assumptions in this calculation are repeated here to emphasize their importance:

³² Note that the price elasticity of supply is about
$$\frac{(8000 - 6000)}{\frac{6000}{(\$20 - \$15)}} = \frac{1/3}{1/3} = 1$$

³³ In the real world, supply and demand curves are not likely to be straight lines, thus the triangular area calculated here is an approximation.

- Decreasing returns to scale (new production is more costly than average).
- Industry output can be aggregated (added together) because products produced by different firms in the industry are nearly identical.
- An appropriate price elasticity of supply separates the impact on the domestic industry into output and price components.
- The market is competitive, with many sellers and many buyers.

Consider now the case of an increase in imports. Suppose a 10 percent fall in the price of imports results in a 10 percent increase in the demand for imports. What happens to the production of domestic substitutes?

It depends. Are the domestic and imported products close substitutes? Even in the case of perfect substitutes, domestic production will not fall by as much as the increased demand for imports, since total demand increases at the lower price. If the two products are perfect substitutes, then domestic producers must lower their prices to match the lower import price. At this lower price, there is greater demand for both the domestic and the imported product. The domestic producer loses from the price cut, but gains from the increased domestic demand.

If the products are imperfect substitutes, we use the cross-price elasticity of demand to find the impact of the fall in import prices on demand for the domestic product, all else being equal.³⁴ In this case, we assume domestic producers make some reductions in price, but do not fully match the cut in import prices. Now some of the increased demand for imports comes at the expense of domestic producers, but the rest is new demand, generated by lower consumer prices. The exact split depends on the elasticities of supply and demand. Profits will fall, but there is convincing evidence that competition encourages cost-cutting measures by firms in the long run, mitigating the fall.

Once you estimate the new price and quantity for the domestic product, you can calculate the change in profits, as above. Suppose a US garment producer lowers price from \$25 to \$24 and lowers production from 50 million to 48 million units, as a result of increased competition from all CBI (Caribbean Basin Initiative) and NAFTA countries combined. How might profits change?

In the short run, we can repeat the calculations above. Profits fall by one dollar per unit on the 48 million units still viable at the \$24 price, plus the smaller margin on the higher-cost production that was phased out. The total area of profits lost is thus \$49 million [$\$1 \times 48 \text{ million} + \frac{1}{2} \times \$1 \times 2 \text{ million}$].

To summarize, changes in trade flows can affect domestic industry in different ways, depending on:

Capacity utilization in domestic industry—At high rates of capacity utilization, additional demand is likely met by price increases, while lower demand may be met by production cuts. At low rates of capacity utilization, the reverse is likely.

Degree of substitutability between foreign and domestic products—For extremely close substitutes, a fall in the price of imports will force domestic producers to match the lower price, lowering profits and production levels. For less close substitutes, we would expect the same changes, but of lesser magnitude. Demand for complementary products will increase when the price of imports falls.

³⁴ But everything else is not equal. If the lower import price lowers demand for the domestic product, the price of the domestic product will fall by some fraction of the fall in the import price. This calculation is fairly complex; please see Appendix 4–1 for details.

Production technologies (increasing returns, constant returns or decreasing returns)—In increasing returns industries, firms are more likely to expand production than to raise prices, and more likely to cut prices than contract production.

Corporate culture—US firms are considered more sensitive to quarterly profits, while Japanese firms are considered more concerned with market share and long-term growth. The price versus quantity adjustments above may reflect these different concerns.

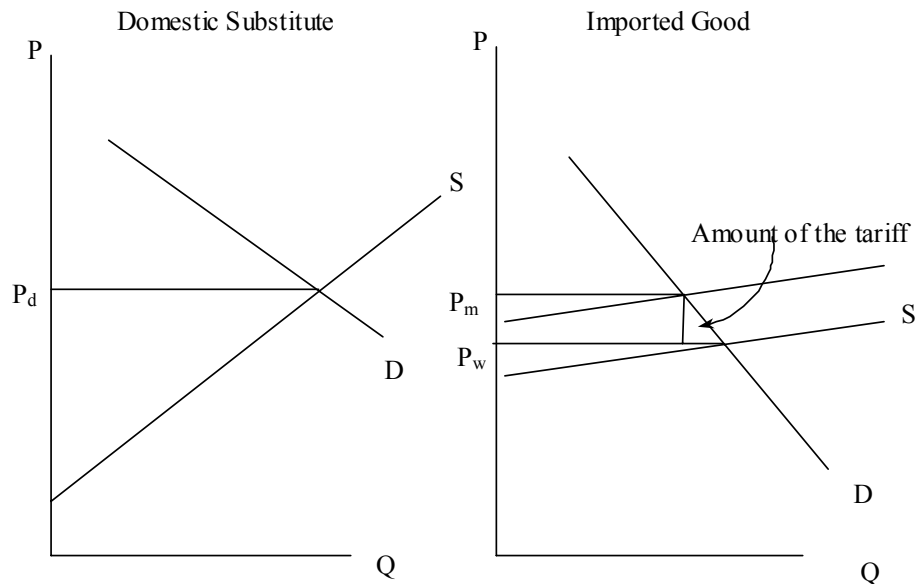
Time frame—Are we considering the short run, when economic decision makers are in the process of adjusting to changes, or the long run, when everyone makes the necessary adjustments?

Industry competitiveness—Is the industry competitive, or does a single firm or group of firms have the power to set prices? Does a change in domestic trade policy (making the domestic market more or less open to imports) affect the degree of competitiveness in the market?

APPENDIX IMPERFECT SUBSTITUTES

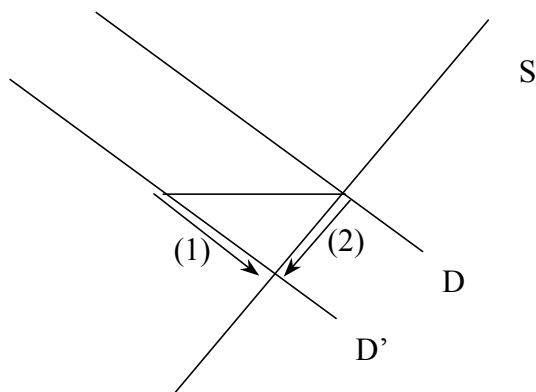
Partial Equilibrium, Imperfect Substitutes

- More commonly, the imported good and the domestic substitute(s) will not be identical to consumers.
 - Manufactured goods with different features, processed foods with different tastes, intermediate goods and final goods of different quality, etc.
- We can only look at imports and domestic production on the same diagram if they are identical.
 - Recall that advertising helps to determine what goods are identical, i.e., Genetically Modified Organism and “regular” corn may or may not be seen as identical by consumers.
- Thus we need to use two diagrams, with linkages between them, for imperfect substitutes.



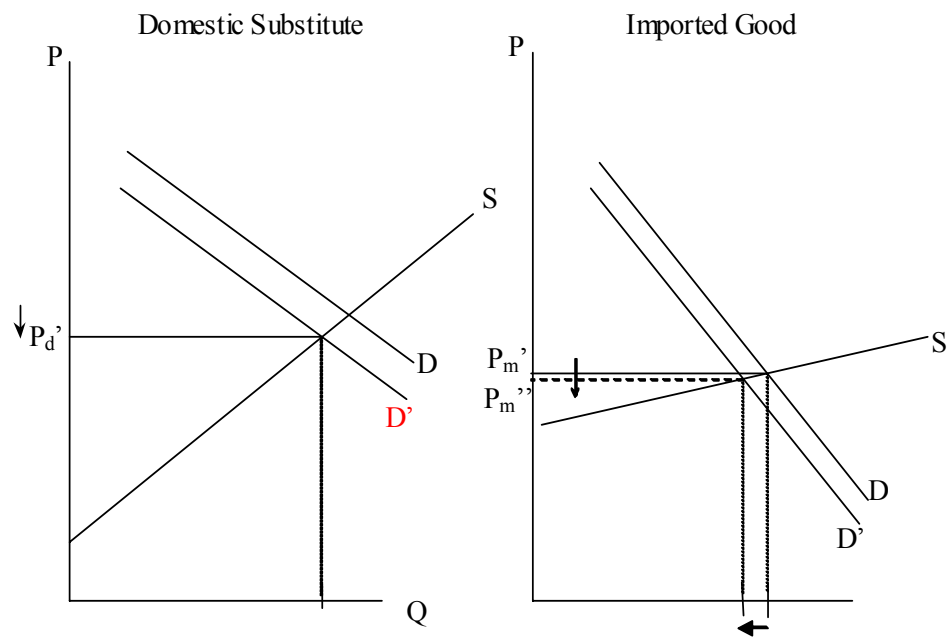
- 1) Domestic price of the imported good falls when tariff is eliminated. Imports increase.
- 2) Lower price of import affects demand for the domestic substitute, based on cross-price elasticity of demand (CPED).
- 3) Lower demand means lower price, output, employment, and profits.

Summary: To get new P,
use PES+PED. To get new
Q, use PES and % change in P.



After the shift in the demand curve, there is excess supply. Price must fall to reach equilibrium...but how much? Suppose the gap is 10 percent. For each one percent fall in price, the gap closes in both directions, as demand increases (1) and supply drops (2). ADD the supply and demand elasticities, and divide the sum into 10. For instance, if $PES=0.5$ and $PED=1.5$, then each 1% fall in price eliminates 2% of the gap, and $10\%/2 = 5\%$ fall in price.³⁵ Now how much has production fallen? Use the supply elasticity to calculate $0.5=X/5\%$, $X=0.5*5\% = 2.5\%$. Another way of thinking about the answer is to say that supply is doing 1/4 of the work ($0.5/(0.5+1.5)$). Thus we will end up 25% of the way away from the old Q. This whole process is an approximation that works best for fairly small changes in D. The answer you compute will almost always be “close enough for government work.”

³⁵ Recall the PES is the price elasticity of supply and PED is the price elasticity of demand.



Note that the fall in price of the domestic substitute leads to a shift in the demand for the import, and a further fall in price, with a partial offset to the increase in imports. We calculate this (if it seems large enough to matter) in the same way.

HINTS AND RULES OF THUMB

- Remember rules of thumb for PED and PES
- Rules for CPED [cross price elasticity of demand = (%change in demand) / (%change in price of related product)]: If the import penetration ratio (imports / (imports + domestic production) = IPR) is small, CPED is generally very small. Why? The contraction in domestic production will be less than the increase in imports, in units.

Example: 100 units are imported at \$10 each, with a \$1 specific tariff, while 900 units are produced domestically. Elimination of the tariff lowers P_m to \$9. If $PED = 1$, imports rise to about 110. Without other information on CPED, we can assume it is close to IPR, since we know that a) imports generally don't displace domestic production 1 for 1, because they are imperfect substitutes, and b) with lower prices for both imported and domestic products, the market will expand. In this example, if $CPED = IPR = 0.1$, then the increase in imports of 10 units would reduce demand for the domestic substitute by 9 units ($0.1 * 10\% * 900$), *before* the domestic price adjustment. After the price falls, the decrease in production is of course smaller.
- The closer the products are to being perfect substitutes, the higher CPED will be. The less similar the products, the lower CPED.
- Unrelated products (logs and peanut butter) will have a CPED of 0.
- Complements (peanut butter and jelly) have a negative CPED, indicating that a fall in the price of the imported complement increases demand for domestic products.
- IPR is a commonly used proxy for CPED. But there are two ways to calculate IPR. For this purpose, you want the volume IPR [$M/(X+M)$] not the value ($[P_m * M / (P_m * M + P_x * X)]$) version.

CHAPTER 5 ESTIMATING THE IMPACT OF TRADE POLICY ON JOBS AND WAGES

The impact of trade policy decisions on jobs and wages is often the central focus of political debate. Most economists are uncomfortable with this focus, because they consider macroeconomic policy the proper economic tool for achieving full employment.³⁶ The three main areas of macroeconomic policymaking are fiscal policy, monetary policy, and exchange rate policy. Fiscal policy covers the manipulation of government spending and tax rates; monetary policy covers the manipulation of interest rates and the money supply; and exchange rate policies cover the manipulation of exchange rates. Most economists consider the reduction of consumer prices, the increase in competition, and the creation of more productive, higher paying jobs the proper focus of trade policy. Whatever the merits from the point of view of economic theory, the political pull towards a focus on jobs is usually so strong that economists and practitioners of commercial diplomacy are drawn into the debate on those terms.³⁷ However, the standard trade calculations introduced in the previous chapter are not appropriate for this debate, since they deal with the direct impact on affected industries, not the overall impact on the economy.

With a few exceptions, trade leads to increased production and jobs that are characterized by higher levels of worker productivity. In a competitive labor market such higher productivity jobs bring higher wage rates. Trade, however, also leads to the elimination of jobs in less competitive industries, whose workers typically have fewer or more narrowly specialized skills and therefore frequently do not have the option of moving into the new jobs being created in the more competitive industries, without substantial retraining. All too often these workers end up in lower paying jobs, and some may remain unemployed, hoping in vain that their previous job will return.³⁸ One of the key concerns over trade policy decisions therefore is the distributional effect: workers with the necessary training, experience and skills gain, while workers without the necessary training, experience and skills lose. In a full employment economy, the debate over jobs therefore is often a proxy for the real issue, which is the impact on low skilled workers.³⁹ A second problem is that openness to trade both accentuates and speeds up the economy's adjustment to new technologies, which has a similar impact on income distribution and unemployment.⁴⁰ Since attacking new technologies gets you labeled a Luddite or

³⁶ Also, estimates of job gains or losses due to trade agreements, even comprehensive deals such as NAFTA, FTAA, or China's accession to the WTO, pale in comparison to the size of the US economy, which created over 2 million new jobs per year in the 1990s.

³⁷ Another way in which economists seek to turn the debate to "firmer ground" is to calculate ratios of consumer gains lost per job protected. These ratios are an attempt to show the cost to society of protecting specific jobs, which may be low wage, undesirable jobs, besides. This will be discussed in Chapter 6.

³⁸ Kletzer, Lori "A Prescription to Relieve Worker Anxiety," (with Robert E. Litan), Institute for International Economics Policy Brief, #PB01-2, March 2001.

³⁹ The term "full employment" does not literally mean that anyone who wants to work can find a job. It means that an additional policy stimulus to create jobs would have a more detrimental impact on inflation than it would be worth, in job creation. Obviously, different policy makers and interest groups have different opinions as to where that point is. The US has opted for a more flexible labor market, with a lower "full employment" rate of unemployment, but with fewer guarantees and entitlements for labor. Proponents would say that the US system is more efficient, relative to the European system's high unemployment and "waste" of human resources, while detractors would claim that the US system lends itself to abuses of part-time and contract workers.

⁴⁰ Wood, A. *How Trade Hurt Unskilled Workers*. Journal of Economic Perspectives, 1995, 9:3.

worse, trade becomes the scapegoat for groups facing technological obsolescence or facing import competition.

Direct Job Creation in Export Industries

One way to estimate the number of new jobs created in export industries from increased production is by multiplying the increased output by the ratio of output to workers in the economy, in the sector, or in the industry. In the United States, this ratio is normally calculated as the number of jobs created by each \$1 billion in output. Since the number of workers required to generate \$1 billion in output differs between services and manufacturing, and differs among industries, estimates based on industry data are likely to be more accurate than estimates based on broader sectoral or economy wide data. All that is required to calculate these ratios is to divide the number of workers employed in the industry by the value of the output in the industry. The primary benefit of this method is its simplicity. It is an appropriate method for most trade analysis purposes, but you should be aware of several weaknesses.

First, as indicated in the previous chapter, industries operate at different levels of capacity utilization, not just of capital but of labor and management resources as well. The first impact of a surge in demand in an export industry may be to decrease inventories, then increase hours worked by existing workers, both production workers, who need to be paid overtime rates, and salaried workers, who merely work harder for the same compensation. Only in the longer run will firms hire and train new workers to meet the higher level of demand. Even then, there is no reason to believe that the expansion in employment will be proportionate to the increase in output. Particularly in an increasing returns industry, the output gain could be achieved with a less than proportional increase in employment. The new demand and scale of operation may make large new labor-saving investments profitable, substantially lowering jobs per billion dollars of output. In a full-employment economy, the high cost of hiring new workers may encourage such labor-saving investments. Strong labor protections, raising the cost of adjusting their labor force, may have a similar effect. Finally, such estimates must be updated regularly, as technological progress allows existing workers to produce more output.

When a policy action affects many different industries, however, quick back of the envelope calculations tend to be based on sector or economy wide output per worker ratios. The number widely (and wrongly) used today for manufactured exports in the United States is 20,000 jobs per billion dollars of output, despite the ratio having declined to just 14,000 jobs per billion in output by the mid-1990s, due to rapid productivity growth. The appropriate number to use for quick, economy wide calculations of the US job effects today would therefore be about 12,500 jobs per billion in output, after five more years of rapid growth in labor productivity.

Indirect Job Creation As a Result of Increased Exports

In addition to the direct employment effects of an increase in production in export industries, we must consider the indirect employment effects in industries that supply inputs or in industries that distribute the output. The number of indirect jobs created can be obtained by using input/output tables (see Chapter 9). These tables are infrequently calculated and therefore are often out of date. They nevertheless provide an order of magnitude estimate.

A commonly used rule of thumb is that each new job created in export industries ultimately leads to the creation of two additional jobs in downstream and upstream industries.
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In today's globalized economy, it is worth considering how many of these additional jobs will be filled by domestic workers. Do US firms have the in-house capabilities to localize products to the Japanese market, or will the associated marketing, service, transportation, and other service jobs be created in Japan? Will the additional demand for components and raw materials be met by affiliates in Malaysia and Mexico? These are important issues to policymakers, and applying rules of thumb without at least cursory study of the industry in question can lead to embarrassing mistakes.

The Difference Between a New Job in an Industry and a New Job in the Economy

There is obviously a difference between an increase of jobs in a particular industry or industries and in the economy as a whole. If there is full employment in the economy, the total number of jobs can increase only through a net increase in immigration or through an increase in the labor force participation of women, retired people, students, or other underemployed groups. In calendar year 2000, for example, the United States had many unfilled positions in software programming and engineering, and one of the major policy issues revolved around increased immigration quotas. Thus one could argue that a fair assessment of the impact of trade on jobs would not focus on jobs lost or created, but on jobs moved from one sector of the economy to another. Acute, long term labor shortages in export industries can be addressed by investments in labor-saving technologies (which raises productivity and pay for existing workers). Alternatively, labor shortages can be addressed by outsourcing portions of the production or support process, in addition to efforts to train domestic workers and bring in foreign workers with needed skills. Which methods a particular company uses depends on relative costs and corporate strategies. We can see all of these strategies at work in the information technology sector.

We need to consider the time frame under which trade impacts jobs. If unemployed workers with the necessary skills are already in the right locations, job growth from exports can occur immediately. But if training or relocation is necessary to match workers with new jobs, the process may take longer. Can textile workers costlessly move to Washington State and become aerospace workers? No, but their children can enjoy higher productivity, higher wage jobs because of a dynamic US export sector and trade.

The Direct Employment Effects of an Increase in Imports

On the other end of the spectrum, an increase in imports can lead to a decline of production and jobs in domestic industries competing with the imports. The relationship is not one-to-one, however, for several reasons. First, some imported products are treated by consumers as distinct products, rather than as substitutes for equivalent, domestically produced goods or services. In such cases, the imports constitute primarily an increase in total demand in that industry, rather than the substitution of an imported product for a domestically produced product. Second, as we saw above, an increase in imports of inputs may be essential to support increased domestic production in downstream industries. Third, in a full-employment economy, imports can satisfy domestic demand that cannot be filled by domestic producers. In other words, a strong increase in domestic demand due to rising incomes can increase imports even as it stimulates additional domestic production. Fourth, an increase in imports from one country as a result of a trade agreement (from Mexico under NAFTA, for instance) may displace imports from other countries (Southeast Asia and South America), leaving net imports, and the impact on domestic production, roughly unchanged.

In light of these complexities, how do we calculate job losses due to increased imports? There is no simple way. We would like a method more accurate than reducing the one-to-one ratio by a judgmental factor, but less difficult than empirically measuring past relationships between increased

imports and job losses in particular industries, and using multiple regression analysis to isolate the impact of increased imports from all other factors that influence employment, such as changes in the business cycle. Rather than making those estimates yourself, you can look for economist's estimates of the cross-price elasticities between imports and domestic products. Once you have such a cross-price elasticity, you multiply it by the percent change in the price of the import to get an estimate of how much demand for the domestic substitute will shift. By multiplying the change in production by the average number of direct and indirect jobs supported by a billion dollars in output you can arrive at a quick general estimate of the jobs created or lost as a result of a policy action. This will overestimate the impact, but the more elastic the demand and the less elastic the supply of this good, the better this rough estimate will be. Appendix 4-1 shows a more precise method of estimation, if time and data quality make that worthwhile. Once you have an estimate of the change in production satisfactory for your purpose, you can use either a jobs per billion employment multiplier or apply the percentage change in production to the current labor force to estimate employment impacts.

Impact of Trade on Labor Productivity and Wages

When political pressure does not dictate a jobs-oriented debate, supporters of trade liberalization are likely to run into fewer analytical problems by focusing on the increase in labor productivity and wages associated with increased trade. Increased trade increases the number of relatively high productivity and high wage jobs, and reduces the number of low productivity, low wage jobs. This can readily be measured by identifying the productivity and wage differential between the industries experiencing export gains on one hand and the industries experiencing an increase in imports and a relative decline in domestic production on the other hand. This difference has been calculated for US trade overall in the 1990s, and the latest data shows a 4 to 5 percent differential.⁴¹ Keep in mind other cases in other countries may produce different results, in magnitude or even in sign.

Just as proponents of trade liberalization are on more solid analytical ground focusing on the productivity/wage equation than the jobs equation, opponents of trade liberalization are on more solid analytical ground by focusing on the adjustment costs and distributional consequences associated with increased trade. An analysis that includes treatment of adjustment costs and distributional effects has the added virtue of pointing to appropriate remedies when the economic advantages of increased trade are believed to outweigh the costs.⁴² It might also indicate accompanying policies to improve the economy's ability to utilize the potential gains from trade expansion in the long run.

One can view the impact of trade policies on jobs in two lights. Trade policies, like technological progress, can increase labor productivity, raising wages but lowering the amount of workers needed to produce the same amount of output. But the second impact of trade is to expand the potential

⁴¹ Other studies estimate different values. For instance, 13 percent from Dept of Commerce study, "U.S. Jobs Supported by Goods and Services Exports, 1983-94," Nov. 1996, and 18 percent from J. David Richardson and Karin Rindal, "Why Exports Matter," The Institute for International Economics and the Manufacturing Institute, July 1995.

⁴² For example, US unemployment insurance is designed to increase the income and consumption of workers laid-off temporary in cyclical downturns (recessions) for a short period of time, until they are rehired during the recovery. Today, most workers laid-off will not get their jobs back, since the problem is technological change or trade pressures, rather than weak US demand. Perhaps they should receive lower benefits for a longer period of time, contingent on entering appropriate adult education or training programs, to facilitate their transition to new careers. Both the existing program and various trade-specific programs (from the Kennedy round through NAFTA-Trade Adjustment Assistance) have failed to achieve the desired outcome of facilitating labor market reentry for workers displaced by trade policy.

market for your product, increasing demand so that more workers are needed, even at the higher level of productivity.

Indirect Impacts of Trade Policies on Jobs

What other impacts result from new trade agreements? Lower trade barriers in foreign markets may encourage domestic firms to move production facilities abroad, to serve either the home market through imports or regional markets abroad. The “giant sucking sound” of NAFTA, as predicted by Ross Perot, involved an anticipated movement of US firms to Mexico to capitalize on cheap labor and lower environmental standards, while producing for the US market. A substantial flow of US investment to Mexico did occur as a result of NAFTA, but there was no corresponding decline in US jobs. Why?

The single most important reason for this apparent paradox is that Foreign Direct Investment (FDI) and portfolio investment to the US surged far more than US investment in Mexico. However, far from being an implication of NAFTA, it reflects the US productivity boom of the 1990s in contrast to economic struggles abroad. If a country has an open capital market, investment opportunities will be gobbled up by someone. Other reasons include:

- 1) **Complementary employment creation in the US.** While assembly and parts operations thrived in Mexico, total production, and thus demand for other parts produced in the US, services (transport, marketing, sales, legal, financial, etc.), headquarters facilities, etc. increased.
- 2) **Investment diversion from other regions.** Some new investments in Mexico were diverted from Southeast Asia or elsewhere in Latin America. These investments were more closely interlinked to US supply chains, thus creating more US jobs than similar investments further afield.
- 3) **Cost savings in Mexico are not as great as they appear.** Better infrastructure, more skilled and productive employees, and lower transportation costs to market make the US the preferred location for most producers. Large US multinationals cannot afford to exploit local labor and environmental laws (actually, in the case of Mexico, poor enforcement of environmental laws), or they will face a public relations nightmare and consumer boycotts. Thus most US producers in Mexico use pollution control technologies (purchased from US suppliers) similar to those used at home.
- 4) **FDI targeting the Mexican market declines.** While new investments in service sectors (banking, telecom, tourism) rose, lower tariffs in Mexico meant less incentive to produce goods in Mexico for the protected Mexican market. Rather than move production facilities to Mexico, some companies now serve the Mexican market more cheaply from existing production facilities in the US. This impact may be particularly large (and surprising) in the case of PNTR/WTO accession for China. Given the riskiness of operating in China (currency, intellectual property rights protection and other legal issues, and political risk), difficulties due to cultural and linguistic differences, corruption, etc., many Western producers may rethink investment decisions in light of opportunities for freer trade.

The points considered above can be generalized more or less to other trade policy changes and other countries.

Thus, while trade agreements often do promote complementary investments, the net effect of these investments on job losses and adjustment costs is uncertain, and unlikely to be large.

To summarize, step one estimates the production changes in domestic industries as a result of trade policy changes, as we did in Chapter 4. Once we have these estimates, we can use one of two rules of thumb, in the absence of detailed information about the industry. We can apply an appropriate jobs multiplier to the production increase (e.g., 12,500 jobs per billion dollars of production, times \$4.5 billion production rise equals 56,250 jobs). Alternatively, we can apply the percentage increase in output to total industry employment (e.g., 3 percent growth in production implies a 3 percent increase in employment from a base of 2 million, or 60 thousand jobs). If applicable in this situation, we can further estimate indirect job impacts as a multiple of direct jobs. A commonly used multiple is 2 (thus 112,500 indirect jobs in addition to the 56,250 direct jobs in the above example), but be sure that those indirect jobs are filled by domestic citizens/residents before using that number in domestic policy debates! Increased demand for labor in a full-employment economy or changes in the demand for labor where employment is inflexible will generally result in wage changes rather than changes in employment levels. Empirically (in the US in the 1990s), wages in export-related industries are higher, on average, than wages in import-competing industries, which is evidence to economists that reducing trade restrictions increases employment opportunities in higher productivity, higher wage jobs. While it might seem that investment flows would intensify and accelerate labor market adjustment problems, both theory and experience argue otherwise.

CHAPTER 6 ESTIMATING THE COST OF PROTECTION TO CONSUMERS

One of the most direct benefits of trade is to lower the cost, increase the quality, or expand the variety of goods and services available to consumers. Since consumer groups are usually not as well organized as producer groups, consumer benefits or costs are not given the same prominence in narrow political decisions in trade as producer losses or gains, particularly where the issue focuses on highly specific goods or services. Nevertheless, in the context of a public debate over the national interest at stake in broad trade policy decisions, consumer benefits and costs often assume considerable importance. Publicizing the costs of protection to consumers is an effective weapon in swaying both public opinion and the views of policymakers.⁴³

Calculating Consumer Benefits and Costs when Price Effects are Known

Of the various consumer benefits of expanded trade, reduction in price is the easiest to calculate. Consumer costs are lowered in two ways. First, virtually all imported goods and services that face protection in the domestic market cost less in their country of origin than the competing domestic products (even after considering transportation costs),⁴⁴ and second, increased competition from imports puts downward pressure on the price of competing domestic products.

Goods and services imported in large quantities usually find a market because they cost less or are of superior quality to domestic products. In developing countries, particularly those with an uneven distribution of income, imports of final goods often serve a high-value market of people willing to pay more for the greater variety or higher quality represented by imports.⁴⁵ This segment of the market is usually quite limited, since the proportion of the population who can afford to pay substantially more for the products they consume is small.

Conversely, a reduction of trade as a result of higher trade barriers increases the price paid by consumers for both imported and domestically produced goods and services. The cost of imported goods or services in such cases rises, either because the consumer is charged for the tariff imposed by the government or the consumer is charged a premium price that reflects the artificial scarcity created by an import quota or regulatory barrier.

The total benefit to consumers is the total money saved as a result of the reduction of an import barrier. By the same token, the total loss to consumers is the total money lost as a result of the increase of an import barrier. If we have the price data, we can calculate a rough approximation of the total benefit by multiplying the price reduction by the quantity purchased, and conversely we can calculate a rough approximation of the total cost of an import barrier to consumers by multiplying

⁴³ At the California Council for International Trade conference in Monterey in January, 2001, a Canadian speaker presented an effective slide showing a cow sitting in a comfortable airline seat. The punch line was that they could fly every cow in Canada around the world on the savings to consumers of eliminating dairy and beef protection in Canada!

⁴⁴ The exception would be markets in which the imported good is perceived of such high quality, relative to the domestically produced substitute, that consumers would willingly pay a substantial premium for the import.

⁴⁵ However, imports of consumer goods usually make up only a small fraction of imports in developing countries, particularly those with substantial trade protection in place. Typically 80% of imports for middle income countries like Mexico, Thailand, etc. consist of intermediate inputs and capital goods, hence the impacts on domestic industries and consumers require more complex calculations, using the rules and models of Chapter 9.

the increase in price by the quantity consumed. This estimate is more precise when considering small changes in quantity from a large base, as would be the case for a very inelastic demanded product.

In making this consumer benefit or cost calculation we must be cognizant that consumers generally buy more of a product at a lower price and less of a product at a higher price. We therefore need to multiply the change in price not by the quantity consumed in the past, but by the average of the old quantity and the expected future quantity when the price increase has taken effect. We can calculate the impact of the reduction or increase in price on consumer demand by multiplying the price change by the price elasticity of demand (PED), the factor that measures the relationship between changes in price and changes in the quantity consumed.

*Estimating the Price Effects of Trade Policy Actions.*⁴⁶

In discussing the calculation of the consumer benefits of a reduction in import barriers, we have assumed that we know how much consumer prices will fall as a result of such trade liberalizing actions. When trade liberalization takes the form of a tariff cut and importers are free to compete openly once they have paid the tariff, we can assume that importers will pass on the full tariff cut to consumers. The percentage price reduction is therefore calculated by dividing the percentage point cut in the tariff by the *landed cost* of the product plus the original tariff.

In basic economics courses, you learn the concept of price. But in the real world, there are many different prices. *Factory-gate* or *farm-gate* price refers to the cost of production only, abstracting from any transport costs to market and mark-ups through a distribution system. Landed cost (or landed price) is the production cost, plus all transport, warehousing, and distribution costs to place that product in a bonded warehouse in the importing country. All trade barriers, inspection requirements, etc. are then assessed when the product leaves that bonded area. *Retail price* is the price paid by consumers, whether they are households, businesses, or government agencies.

Thus if the tariff on imported tomatoes was cut by five percentage points from 10% to 5%, the expected price reduction will be 5 divided by 110, which is approximately 4.5%.

What if the trade liberalization action involves a larger quota or the removal of a regulatory barrier? How can we calculate the cut in the price of imported products in this case? We can devise a fairly good estimate if we know by how much imports will increase as a result of the policy measure, and we have an estimate of the price elasticity of demand. In effect, what we would be calculating is how much prices must drop to convince consumers to purchase the increased imports. In other words, we would be working backwards. We calculate the implied price change by multiplying the percentage increase of imports by 1 divided by the price elasticity of demand for the imported product. If the price elasticity of demand for tomatoes is 1.5 and the elimination of a quota will increase consumption by 12%, then the implied price cut is 12% divided by 1.5, which is 8%.⁴⁷ Of

⁴⁶ For additional details, see the extensive treatment of this topic in Chapter 4.

⁴⁷ Recall from Chapter 3 that the elasticity is equal to the percent change in quantity divided by the percentage change in price. So in this example $PED \text{ for imports} = \% \text{Change in quantity demanded} / \% \text{Change in import price}$. If $PED=1.5$ and $\% \text{Change in quantity demanded}$ is 12%, then we solve for $\% \text{Change in price}$. So, if the PED for tomatoes is 1.5 and the elimination of a quota will increase consumption by 12%, then the implied price cut is $12\%/1.5$, or 8%.

course, if we don't know how much imports will increase when we eliminate a quota, we have to make the best estimate possible on the basis of available data.⁴⁸

Calculating the likely price increase that will result from a quota or other quantitative restriction on imports involves the same calculation as above. We divide the percentage cut in imports created by the quota by the price elasticity of demand for the imported product.

As noted earlier, a trade policy action will affect not only the prices charged for imported products, but will also affect the prices of competing domestic goods. In a fully competitive economy, a fall or rise in the price of imported products will cause an equal fall or rise in the prices of equivalent domestic products. In cases where domestic competition is restricted or where domestic products are not full substitutes, the price changes in similar domestic products will be less than the price changes for imports. The approximate way to carry out these calculations involves the use of cross price elasticities of demand, as shown in Appendix 4-1.

We calculate consumer benefits and costs of the changes in the prices of domestic products in the same way we calculated the consumer benefits and costs of the changes in import prices. For a rough estimate, particularly if demand is inelastic, we multiply the change in price times the initial consumption level. A more precise estimate would be the change in price times the average of the pre- and post-adjustment consumption levels.

⁴⁸ *Tariffication*, the process of replacing quotas with equivalent tariffs, is an excellent example. The Uruguay round agreement required tariffication in agriculture. Policy makers faced exactly this question: how much would prices fall and domestic production decline if our quotas are eliminated, and what degree of tariff protection would exactly replace the quota. Policymakers were in the unenviable position of risking the wrath of domestic farmers of admitting the true extent of protection in agriculture to the international trading community. Most elected to replace quotas with tariffs, with Japan instituting a rice tariff of 780% to replace its quota restrictions!

APPENDIX THE ECONOMIC CONCEPT OF CONSUMER WELFARE AND HOW IT IS CALCULATED

A fundamental principle of economics is that consumers maximize their *utility*.

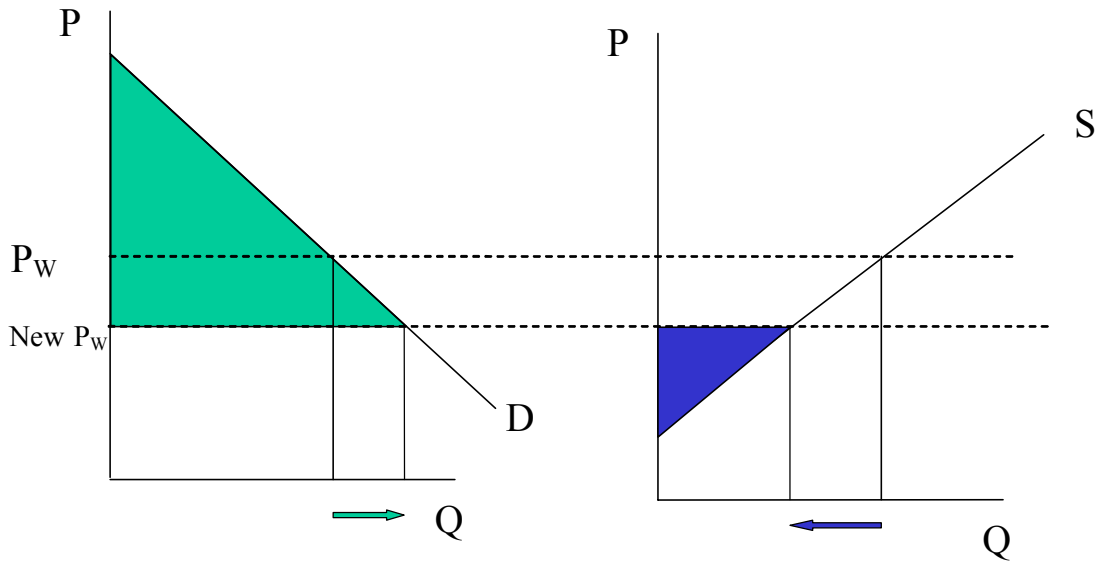
Utility is the term economists use to approximate a person's happiness. The two terms will be used interchangeably below.

Happiness is linked to real income, or purchasing power.⁴⁹ Real income increases with a rise in income (holding prices constant) or a decrease in prices (holding income constant). We have seen in Chapter 5 that the impact of trade liberalization on income will be different across occupations, and while we would expect it to be positive in the long run, as workers move into higher productivity employment, it may be zero or even negative in the short run. Thus a short-run analysis can focus on consumer gains or losses from price changes, while a longer run estimate should incorporate income growth.

Consumer surplus is defined as the area below the demand curve and above the price. For each unit of product consumed, it is the difference between the maximum amount that would be paid (based on the demand curve) and the market price. Figure 6–1 illustrates the amount of consumer surplus present before and after trade liberalization (or before and after the imposition of a new trade restriction, if you reverse the calculations). A rise in price reduces consumer surplus, and a fall in price increases it. The shape of the entire consumer surplus is a triangle, so the shape of an increase or decrease in consumer surplus is a rectangle equal to the change in price times the old quantity demanded, plus (if price falls, or minus if price rises) a triangle whose area is one-half of change in quantity demanded times the change in price. *Ceteris paribus*, an increase in the price increases producer surplus and decreases consumer surplus, while a decrease in price does the opposite, as shown in Figure 6–1.

⁴⁹ For people unhappy with the philosophy of happiness being equated with additional consumption, consider that increased income provides opportunities to both increase personal consumption and to help friends and family, expand charitable giving, etc. Also, technically, we should specify that happiness is related to disposable income (income after all taxes). Thus we are assuming below that taxes and tax policies are constant, and thus not linked to the trade taxes and policies we are studying. This may not be true in the real world, if trade taxes are replaced by taxes of other sorts.

Figure 6-1 Producer and Consumer Surplus



SOME SAMPLE CALCULATIONS

Suppose a quota on peanut imports is removed, allowing peanut prices to fall by \$0.15 per pound, or 20 percent. Using an estimated price elasticity of demand for peanuts of 0.25, you then estimate that consumption of peanuts will rise from 4 billion to 4.2 billion pounds. What is the increase in consumer surplus?

The “rough estimate” of 4.0 billion times \$0.15 = \$600 million works pretty well in this case, since the percentage change in total consumption is less than 10 percent. The more precise estimate is 600 million plus $\frac{1}{2} * \$0.15 * 0.2$ billion = \$615 million.

Suppose policy makers in Japan are considering a tariff on imported towels, since domestic producers are facing heavy competition from China. If policy makers institute a 25 percent tariff on towel imports, towel consumption is 2 billion (both imported and domestic towels are considered to be perfect substitutes by consumers), the price of towels is currently 500 yen, and the price elasticity of demand for towels is 0.8, what will be the impact on domestic consumers?

We would expect domestic prices to rise by about the amount of the tariff, from 500 to 625 yen. The rough estimate is then 125 yen * 2 billion, or 250 billion yen (or \$2 billion, at an exchange rate of 125 yen/\$).

The more refined estimate takes into account the reduction in consumption from the rise in price. The 25% price rise will discourage consumption by 20 percent, given the PED (price elasticity of demand) of 0.8. A twenty percent reduction in consumption will lower demand from 2 billion to 1.6 billion, so we must subtract the triangle $\frac{1}{2} * 125 \text{ yen} * 0.4 \text{ billion} = 25 \text{ billion yen}$ from the initial estimate of 250, for a total of 225 billion yen. Note that this adjustment is more substantial than in the case above, due to the greater price change and the more elastic demand.

Many studies of the cost of protection exist. Typically, studies look just at the cost of protection for a single commodity, as in the examples above. A few studies attempt to quantify the impact of protection across many sectors of the economy. Hufbauer and Elliot estimate that free trade, in the 21 sectors they study, would have provided an additional 32.3 billion dollars of consumer surplus to US consumers in 1990.⁵⁰ Garments and textile protection is by far the most costly to US consumers, accounting for about three-quarters (24 billion) of the cost. Since the elimination of protection of garments and textiles would cost just under 170,000 jobs in the industry (direct impacts only), they say that the cost to consumers per job “protected” is about \$144,000. These numbers can sway policymakers in a way that is much more persuasive than \$32.3 billion or \$115 per person in the US. Proponents of protection, like sellers of life insurance, claim that protection “costs just pennies per person per day.”⁵¹ We can see both sides of the policy debate searching for ways to illustrate their points.

A similar study for Japan estimated the cost of protection to consumers in 1989 at 15 trillion yen, or about \$115 billion.⁵² Note that the cost to consumers is estimated nearly four times higher, in an economy half the size of the US. But, unlike the US, where less than half of consumer loss is captured by producers, almost two-thirds of consumer losses are captured by producers in Japan. These estimates indicate that producers are much more powerful in Japan, relative to consumer groups, and/or that measuring implicit protection in Japan (average tariffs are lower than the US) is very difficult.

In his recent book, *Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s*, Patrick Messerlin estimates that the EU average level of protection is 13–14%, substantially above most estimates. Moderate protection of most manufactured goods is offset by substantial protection of iron and steel, tobacco, and most agricultural products. Elimination of this protection would provide gains to consumers of 6–7% of the EU GDP, he says, an amount equal to the economy of Spain!

⁵⁰ Measuring the Cost of Protection in the United States. Washington, DC: Institute for International Economics, 1994.

⁵¹ Note that 280 million pennies times 365 days in a year is just over a billion dollars.

⁵² Sazanami, Urata, and Kawai Measuring the Cost of Protection in Japan. Washington, DC: Institute for International Economics, 1995

CHAPTER 7 ESTIMATING THE ECONOMIC EFFICIENCY GAINS OF TRADE

Individuals engaged in trade are concerned with making money. But in the vast majority of cases, guided by Adam Smith's "invisible hand," the process of making money tends to improve economic efficiency and enhance welfare for the participant countries. Trade allows a country to concentrate more of its resources on goods and services it produces more efficiently, relative to other products and countries. This follows from the concept of comparative advantage. It involves so-called allocative or static efficiency gains. In some sectors of the economy, expanding the scale of production to serve the regional or global market leads to further cost savings and efficiency. Trade also stimulates domestic producers to adopt more efficient production methods and to develop new products that better meet consumer tastes.⁵³ These two factors contribute to what economists call dynamic gains from trade.

Together the static and dynamic gains allow a country to produce more with its existing resources than they could without trade and to improve its economic growth rate.⁵⁴ Precisely measuring these economic efficiency gains is generally beyond the scope of back of the envelope calculations, but trade policy analysts should understand the concept of comparative advantage and know the rough magnitude of national gains from trade, the bedrock on which arguments for trade liberalization rest. Many professional economists have undertaken empirical studies that are available to trade analysts. Later in the chapter we will point to some of these studies, and in Chapter 9 we will discuss how to interpret the results of these and other professional studies using econometric and statistical models.

We can approximate the overall growth impact of trade liberalization by examining the growth performance of a comparable country that has gone through a major liberalization of its trade. The difficulty, of course, is to isolate the impact of trade liberalization from all other factors that affect growth. Often trade liberalization is just one element of a reform package that impacts growth in many ways. If enough countries facing different circumstances have similar results, one could conclude that there is some empirical basis for believing the same would happen elsewhere. A second approach is to do a counterfactual study, and compare the total value of production in an economy in a given base year with potential output, if all resources were allocated efficiently. A third approach is to run a regression, to quantify the degree of openness in many countries, and see if growth rates are positively related to openness to trade. Strengths and weaknesses of these various approaches, including regression analysis, are covered in Chapter 9.

It is generally easier to estimate the potential gains from trade liberalization for a single product, what economists call a partial equilibrium estimate. Here, the focus is not on the greater value of

⁵³ Maruti in India produced the same model car from the 1960s through the 1980s, behind high trade barriers. It was felt that insulating producers from demands of consumers would lead to greater efficiency, since the cost of retooling to build cars with larger or smaller tail fins each year could be saved. With a single national producer, R&D expenditures diminish, and advertising costs are minimized as well. Yet production costs in India never did fall to the levels of Japan and the US, even with the labor cost advantage, and producers failed to meet the changing needs of consumers for safer and more fuel-efficient cars. And, as the old joke goes, "You can have any color you want, as long as it is black." As part of the economic liberalizations of the 1990s, two joint ventures with Japanese carmakers were approved and trade barriers were lowered. India's auto production has been revitalized even as prices fall and choices expand.

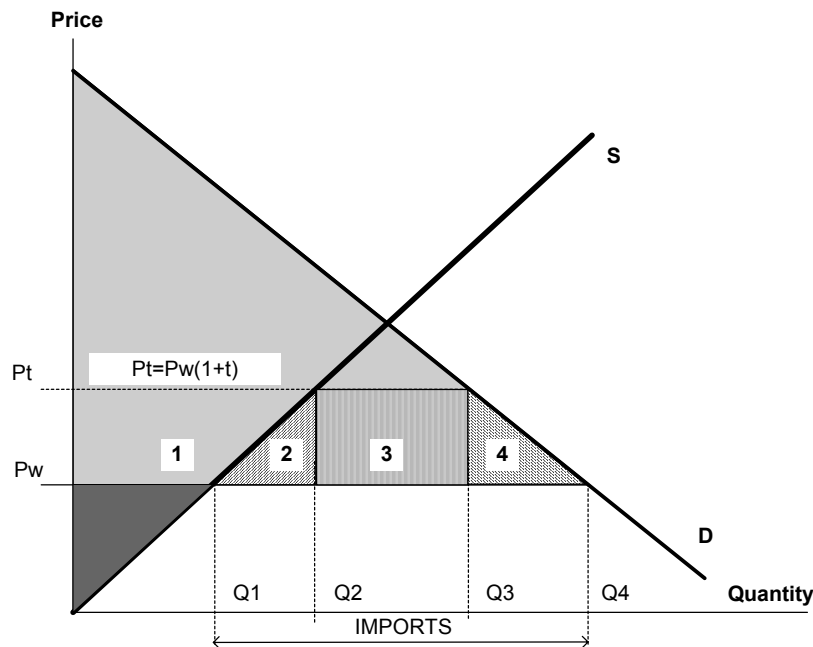
⁵⁴ Even more obvious gains from trade exist when countries trade for products (natural resources, consumer goods, intermediate goods, and capital goods) not found or not producible domestically, due to resource endowment, climate, technology, etc. A third type of gains from trade rests in the exchange of different varieties of the same product (California wines for French wines, Fords for Toyotas, Dell and Toshiba lap tops, etc.), expanding consumer choices. These gains from trade are somewhat more difficult to quantify, but no less important.

production possible if resources are transferred to another sector of the economy, but on three aspects of protection in that protected sector. The first is the additional cost of making a product at home, compared to the cost of importing the product. The second cost is the consumer surplus lost at the higher domestic price, due to lower consumption. The third aspect is the change in government revenues. In the following section, we compare the gains to producers and the increase in government revenues (in the case of tariff protection) to consumer losses to calculate a net national impact of protection. The same exercise in reverse shows the net national impact of trade liberalization.

Partial Equilibrium Measures of the Cost of Protection

Before beginning this section, we need to make two points. First, and most importantly, this simple model examines only static gains from trade. Some economic studies indicate that dynamic gains may be several times larger.⁵⁵ Secondly, trade policy changes typically affect many sectors of the economy. A partial equilibrium model gives you just a partial picture of the impact on the entire economy. Nevertheless, such partial equilibrium studies are an important first step towards understanding the costs of protection, and they are widely used in policy debates.

Figure 7-1 Partial Equilibrium Competitive Model /Small Country



⁵⁵ Baldwin, R. "Measurable Dynamic Gains from Trade", *Journal of Political Economy*, vol. 100, 1, pp 162-174, 1992.

EXPLANATION

In this example shown in Figure 7–1, a tariff has raised the domestic price (or the price domestic consumers must pay) from P_w (the world price) to P_t (the domestic price, including the tariff). At a higher price, producers can increase their output. Firms which would have been inefficient at the lower world price can now enter the market because their marginal costs of production are between P_w and P_t . Notice how total producer surplus has increased from the small dark triangle to the small dark triangle + Area 1. But consumers now pay more for both domestic production and imports.

Before the tariff was imposed, consumers paid P_w for Q_4 ; now they pay P_t for the smaller Q_3 . The additional amount they are paying corresponds to Areas 1, 2 and 3 in the figure. Area 1 becomes additional producer surplus, and therefore represents a transfer from consumers to producers. But what happens to Area 2? Area 2 represents the additional production costs of the less efficient producers. It is a loss due to inefficiency and represents what economists call a *dead-weight loss* due to domestic production that costs more to produce than the cost of imports at the world price.

Dead weight loss in this case is the cost associated with overproduction and underconsumption. Overproduction occurs because the additional production in response to the higher domestic price is more costly than importing the good. Hence, even though the trade restriction has made additional production privately profitable, the production is inefficient by international standards. Underconsumption is the result of some consumers being priced out of the market, despite their utility from consuming more of the good exceeding the cost of importing it.

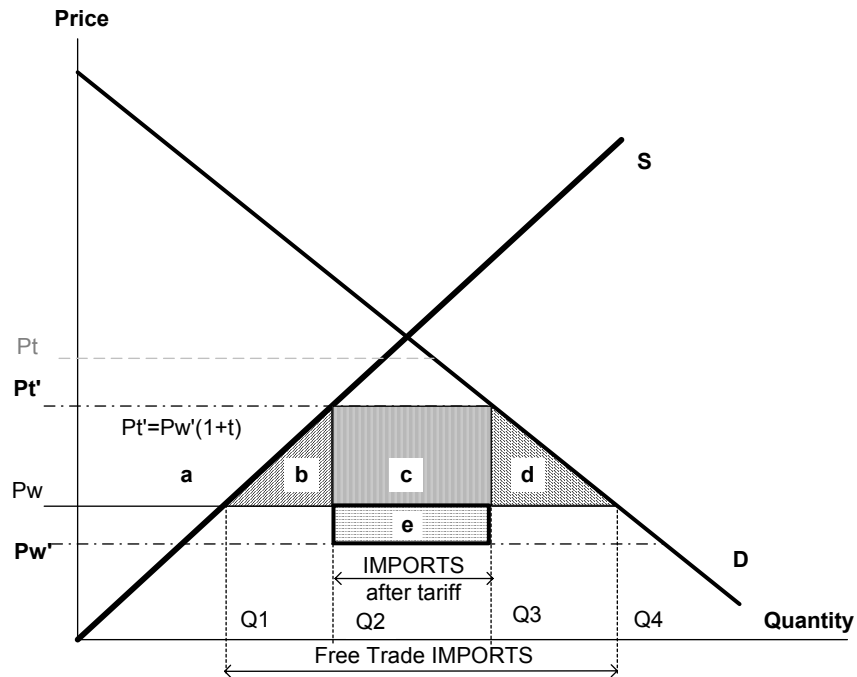
Area 3 is the tariff revenue collected by customs on all incoming imports of this product. It is important to remember that the tariff or import tax is only collected for imported goods, not domestically produced goods. Thus Area 3 is a rectangle whose base is the amount of imports entering the country under the tariff, and the height is the rise in price due to the tariff. This area is transferred from consumers to the government. Foreign suppliers still supply their goods to the importing country at the world price, but after the tariff is added, consumers must pay $P_w * (1 + \text{tariff})$, or P_t .⁵⁶ It is also worth noting that while the foreign suppliers may still receive the world price for their goods, they sell less of those goods (Q_2Q_3 instead of Q_1Q_4), so their revenue shrinks.

Let's consider consumers. Because the domestic price level has risen, consumer surplus has shrunk, both due to the higher product price, but also due to the reduction in consumption at that higher price. Recall that consumer surplus is the area below the demand curve and above the price line. Now that the price line has been raised, consumer surplus has shrunk by Areas 1 + 2 + 3 + 4. Area 1 was transferred to producers in the form of producer surplus. Area 2 was a deadweight loss from inefficient production. Area 3 was transferred to the government in the form of tariff revenue. And Area 4, like Area 2, does not get transferred to anyone. Area 4 is another deadweight loss. Why? Consumers are paying more and getting less, and Area 4 represents part of this loss. Consumption that would benefit individuals is not taking place, due to the higher domestic price.

To sum up, Areas 1 and 3 are transferred from consumers to producers and the government. So the total net loss to national welfare from imposing the tariff equals Areas 2 and 4. To measure this net loss in financial terms, we sum the areas of the two triangles. (Recall that the area of a triangle = $\frac{1}{2} * \text{base} * \text{height}$.) Often the area of the two triangles can be calculated together, since the combined base is the change in imports and the height is the change in domestic price.

⁵⁶ For an ad valorem tariff, $P_t = P_w * (1 + t)$, as shown. For a specific tariff, $P_t = P_w + t$.

Figure 7-2 Partial Equilibrium Competitive Model /Large Country



With a *large country*, some new complications are introduced.

A large country is one that imports a significant proportion of total world exports. Thus its trade policies impact world prices. For instance, while no single European country affects the world price of wheat, European Union trade policies indeed affect world prices.

If such a country were to restrict its imports (e.g. by imposing a tariff), this would result in a sufficient dip in total world demand to lower world prices. In this diagram, the world price falls from P_w to P_w' . What are the implications in terms of producer surplus, consumer surplus, deadweight losses and tariff revenue? Using the same logic of the previous example, consumer surplus shrinks by the amounts represented by Areas a + b + c + d. Producer surplus increases by Area a, and the deadweight losses equal Areas b + d. It is important to note that consumer surplus, producer surplus and the deadweight losses are based on the change in the domestic price, since they are “before” and “after” comparisons of options available to domestic consumers.

Government tariff revenue, on the other hand, is calculated differently. Tariff revenue is equal to the new quantity of imports multiplied by the amount of the tariff (or import tax). In this example the import tax is equal to the difference between P_t' and P_w' . So tariff revenue is equal to Areas c + e. Area c is transferred from consumers (part of the lost consumer surplus) to the government, but where does Area e come from? Area e is a gain to national welfare, at the expense of foreign exporters. Not only do foreign exporters lose revenue because of the reduced import demand, but they also lose from lower world prices. Area e represents the difference between the old, higher world price and the new, lower world price on post-tariff imports.

Therefore, in order to determine the overall impact on national welfare for a large country, one needs to consider both the gain from lower world prices (Area e) and the deadweight losses (Areas b + d). The so-called optimal tariff is a tariff which maximizes the positive difference between Area e and Areas b + d. However, even an optimal tariff may result in a decline in national welfare, if it induces

a country's trading partners to place their own optimal tariffs on its export products in which they are large importers.

Figure 7-3 Partial Equilibrium Competitive Model Large Country, Example

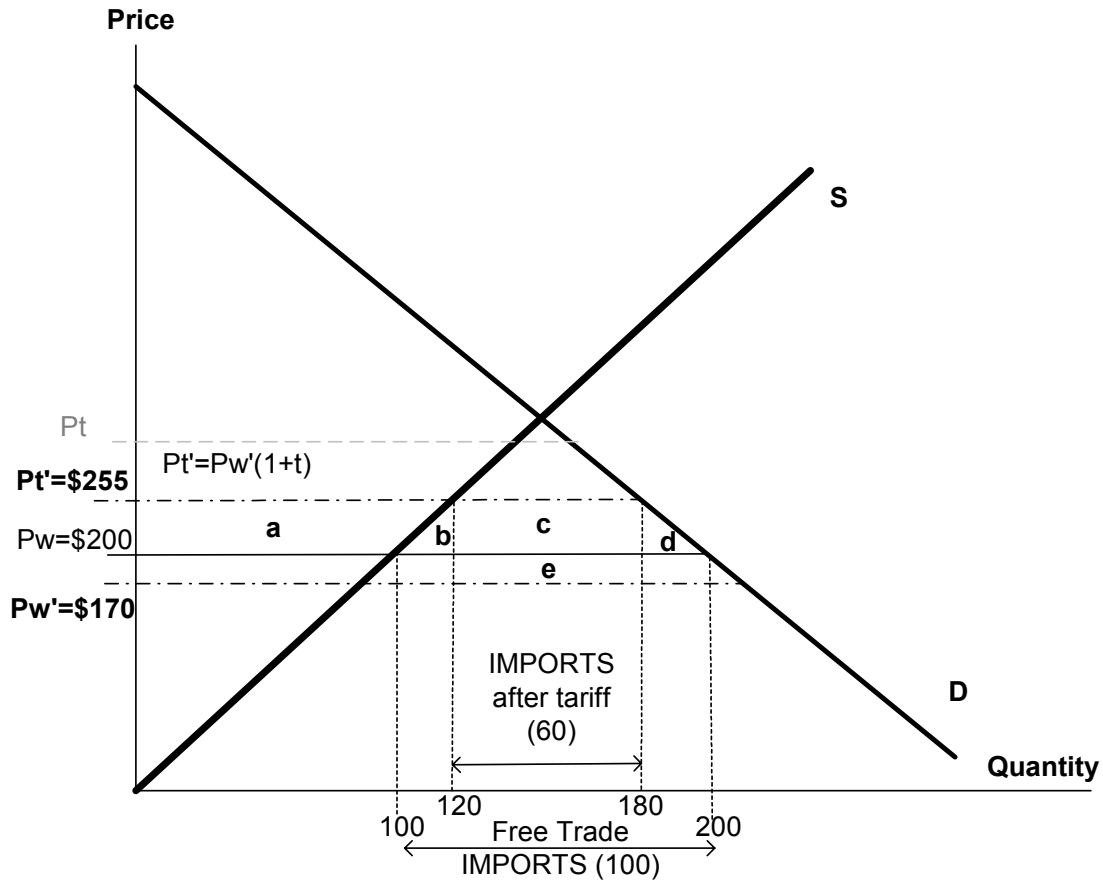


Figure 7-3 presents a numerical example with the various areas and totals calculated. We see that the US benefits from the largess of its market. Sugar protection creates national gains at the expense of foreign exporters (including poor developing countries in Latin America, Asia, and Sub-Saharan Africa). US sugar policies are actually much more complex than indicated in this simple example.

In this example, imposing a 50% tariff on US sugar imports lowers the world price of sugar from \$200/ton to \$170/ton. Thus, the new domestic price rises by less than 50%, to \$170/ton * 1.5 = \$255/ton. Suppose US sugar production rises from 100 to 120 tons and consumption falls from 200 to 180 tons. Then, the deadweight social loss (b+d) is: $\frac{1}{2} * (\$255 - \$200) * [(200 - 180) + (120 - 100)] = \$1,100$.

Area e is $(\$200 - \$170) * (180 - 120) = \$1,800$. The change in national welfare is: $e - (b + d) = \$1,800 - \$1,100 = \$700$

Studies of the Impact of Trade Policies on National Welfare

Numerous economic studies attempt to measure the net impact of trade policies on national welfare. We can put such studies into several sub-categories:

- 1) Specific trade policies (NAFTA, EU, etc.) or free trade with the world.
- 2) Static efficiency only, or static and dynamic efficiency.
- 3) Competitive markets or non-competitive markets.
- 4) Trade only or investment changes as well.

Not surprisingly, the largest impacts on national welfare are from studies that examine global free trade, dynamic efficiency, non-competitive markets, and foreign investment. Such studies yield estimates of potential gains as high as 8 to 12% of national income for such medium-sized countries with moderate trade barriers as Canada and Mexico.⁵⁷

Estimates of the potential gains from trade for the huge US economy tend to be much smaller. Without dynamic gains or investment effects, these estimates are around one half of 1%.⁵⁸ One study indicates that the elimination of all US tariffs would *reduce* national welfare by 0.6%!⁵⁹ The elimination of quotas and other quantitative restrictions would raise national welfare by 1.3%, for a net benefit of free trade.

Another way to highlight the benefits of trade liberalization is to look at global gains, rather than national gains. An Australian study placed the global gains from cutting all trade barriers in half at \$400 billion (US).⁶⁰ A rule of thumb to remember is that, due to the nature of deadweight social loss triangles, a 50% reduction in trade barriers captures about $\frac{3}{4}$ of the potential gains from liberalization.

⁵⁷ Adams, Alanis and del Rio, "The Mexico-US Free Trade and Investment Area Proposal," *Journal of Policy Modeling*, 14(1), pp. 99-119; Young and Romero, "A Dynamic Dual Model of the North American Free Trade Agreement," and Sobrazo, "The Gains for Mexico from a North American Free Trade Agreement," both in *Modeling Trade Policy*, Francois and Shiells, eds., (NY: Cambridge U. Press, 1994) (for Mexico). Cox and Harris, 1984, for global free trade for Canada.

⁵⁸ But even half of one percent of the US economy is nearly \$40 billion dollars, much more than the total amount of US aid to developing countries.

⁵⁹ Goulder, 1992. The implication is that the US is such a large consumer of many products that its tariffs force world price down in many cases, creating national gains at the expense of foreign exporters, as shown in the figure 7-3 above.

⁶⁰ *Financial Times*, May 26, 1999.

APPENDIX CANADIAN EXPORTS OF SOFTWOOD LUMBER TO THE US: A HISTORY OF CONFLICT

Background information

History: The US and Canada have been arguing about softwood lumber trade for “hundreds of years.”⁶¹ The most recent conflict followed the expiration of a five-year VER (voluntary export restraint), which limited US imports from Canada to 14.7 billion board-feet of lumber per year. The SLA (softwood lumber agreement) itself was a desperate compromise in the face of growing uncertainty and price fluctuations. Early in 1993, prices in the US market surged from \$260 per tbf (thousand board feet) to over \$500. By mid-year, the price had fallen back below \$300, but it surged over \$500 again by early 1994, only to fall to \$350 just three months later.

Like most compromises, the SLA was resented by both sides. Yet it did bring higher and more stable prices, as was its intent. One could argue that Canadian producers benefited, in terms of profits relative to free trade, but the Canadian government was more concerned with the reduction in production levels and jobs.⁶² Even during the SLA, which lasted from April 1996 to March 2001, legal questions arose on the allocation of this quota among producers. The Canadian government was accused of allocating the quota primarily to Canadian firms, discriminating against US multinationals in Canada. Uncertainty on market conditions after the SLA and a sluggish US economy caused prices to spiral from \$380 per tbf to \$260 in the final months of the agreement.

Note also that the period 1996 to early 2001 was a time of rapid economic growth in the US. With a quota protecting domestic competitors from increased imports from Canada, booming demand in the construction industry led to higher prices, increased production, and greater profits for US forestry, mills, and pulp and paper producers. Not surprisingly, given this economic situation, the end of the agreement led to a surge in imports from Canada. US producers didn't even wait for the surge of imports, they immediately requested protection based on *threat* of injury.

Reasons for the Dispute: US producers do not dispute that Canadian producers have lower costs of production, and hence Canada has a comparative advantage in softwood lumber. However, they say that this cost advantage is the result of government manipulation of prices. Apart from the maritime provinces, most logging in Canada takes place on publicly-owned “crown” lands. While Canada's government charges for harvesting timber on public lands, the fees are set arbitrarily, and are not based on competitive auction or other market allocation systems. Hence US industry argues that artificially low fees represent an unfair subsidy to Canadian forestry. Furthermore, the logging subsidy is passed on to sawmills, and hence to the cost of lumber, since direct export of logs is prohibited and much of the logging rights are given directly to the mills, with loggers as subcontractors. Subsidies by national governments can be remedied by Countervailing Duties (CVD) under WTO rules. US industry also gripes about less strict environmental protection in Canada, but this is not actionable under the WTO.

⁶¹ CBC News, 8/15/02, from www.cbc.ca/news/indepth/background/softwood_lumber.html

⁶² See the section on evaluation, particularly the first figure, beginning on page six.

Secondly, US industry charges that Canadian firms engage in price discrimination by selling lumber more cheaply in the US market than in the domestic market. While such price discrimination is a normal part of profit maximization for firms domestically, it is (for reasons unconvincing to economists) illegal internationally under the WTO. Hence US industry argued for anti-dumping duties (ADD) *in addition* to CVD.

A third issue, not mentioned by either side in the debate, is the impact of the weak Canadian dollar on production costs in Canada. In the first three months of 2001, the Canadian dollar fell from the already depressed level of \$0.67 to \$0.63. Assuming, based on historical data, a long run equilibrium rate of \$0.70, the Canadian currency was undervalued by about 10%. Had the Canadian dollar quickly recovered to this hypothetical equilibrium, the subsequent dispute might have been easier to resolve. Instead, as of September 5, 2002, the Canadian dollar is still worth just \$0.64.

Players: Before examining how these requests were handled, consider the stakeholders and coalitions.

- Pro-trade:
 1. Canadian forestry industry (logging and mills)
 2. Canadian forestry labor
 3. Canadian governments, both national and provincial, both as representatives of the two groups above and as recipients of tax revenues and beneficiaries of economic growth
 4. US consumer groups, in this case dominated by the construction industry and “big box” retailers like Home Depot, Orchard Supply, etc. See the National Association of Home Builders as a coalition example. End-use consumers are also affected, to the extent that higher costs of production are passed through as higher costs of new homes and home remodeling. See American Consumers for Affordable Homes. However, it is likely that this coalition derives most of its financial backing from the above corporations as well.

- Supporters of trade restrictions:
 1. US forestry industry. Example of lobbying efforts: Coalition for Fair Lumber Imports, including International Paper, Potlatch, Plum Creek, Sierra Pacific, and Temple Inland. The US industry is somewhat segmented geographically, with the Southeastern US the second largest lumber-producing region, the best organized, least integrated with Canadian industry, and extremely well-connected politically.
 2. US forestry labor. The United Brotherhood of Carpenters and Joiners (Portland, Oregon) and the Paper, Allied-Industrial, Chemical and Energy Workers International Union of Nashville, Tennessee signed the Coalition for Fair Lumber Imports’ petition.
 3. Canadian environmental groups, including Native American groups. Note that their interests are more subtle; they want reduced production of forest products in both countries, not just a reduction of logging and exports from Canada. Thus their statements read: “Subsidies to logging *wherever they occur* in North America are bad for the environment.” (Emphasis added) They continue, in an effort to broaden the scope of the debate, with: “Inadequate environmental protection is tantamount to a subsidy and requires investigation.”⁶³

⁶³ Sierra Club of Canada, 5/2/02, from <http://forests.org/articles/reader.asp?linkid=10636>

4. US producers of *substitutes* for lumber, such as steel framing products and engineered wood products. The Steel Framing Alliance is an example of a coalition in this area. Note that how much they would be affected, and hence how actively they would participate in broader coalitions with the three groups listed above, depends on estimates of likely price changes and the cross-price elasticity of demand between wood and steel framing products, etc.
5. Other US industries that support strict enforcement of US “fair trade laws” such as anti-dumping, countervailing duty, and safeguards, which give US producers certain legal rights under US trade laws.

Even the identification of stakeholders and their interests is not simple. Some US companies in the western US have forestry operations in both countries (such as Weyerhaeuser). Others have both forestry operations *and* write home mortgages. Canada’s maritime provinces, which have not been subject to US trade restrictions for reasons outlined in the next section, actually benefit from higher US prices (softwood lumber production in Nova Scotia and New Brunswick increased by 62 percent over the 5 years, with the US market the primary destination). While forestry workers are also home buyers, clearly the impact on employment and wages dominates the second-order effect of higher home prices.

The US government is not listed above. The US government is required by law to enforce anti-dumping and countervailing duty statutes, although it has some leeway in deciding what constitutes a foreign subsidy and how to measure the amount of dumping or subsidy. It has the option of negotiating agreements with other governments that would eliminate the affects of the dumping or subsidy. Hence the positions taken by the US government are dependent on its legal obligations, the lobbying effectiveness of various producer and consumer groups, and the merits of the case. While the final decisions on the existence of injury and magnitude of compensation are made by the US ITC and Department of Commerce, respectively, lobbying efforts may target members of Congress,⁶⁴ the media, or the public directly.

Charges and counter-charges

A timeline of the dispute:

April 1, 1996: VER of 14.7 billion board-feet per year introduced

Early 2001 to March 31, 2001: Negotiations on an extension or a new deal break down. British Columbia favors accepting US demands to avoid formal trade restrictions, while Ottawa and Quebec favor pushing for free trade and resolution of disputes through WTO and NAFTA dispute resolution panels.

March 31, 2001: VER of 14.7 billion board-feet per year expires.

April 1, 2001: One day after the expiration of the agreement, US lumber producers announce that they would call on the US International Trade Commission to impose anti-dumping and countervailing duties of up to 70 percent on Canadian softwood lumber. The Department of Commerce initiates an investigation later that month.

⁶⁴ The final announcement of the provisional duties, decided by the Commerce Department, were announced in March 2002 by Senator Cochran, at <http://cochran.senate.gov/press/pr032202.html>

June 29, 2001: A WTO dispute panel issues its first ruling on the US-Canada dispute. They rule that the export ban on logs could not be considered a subsidy for the softwood lumber industry. However, they also rule that the US trade laws under which the broader charges (including subsidies from below market fees charged by the government) were made (Section 771 of the Tariff Act 1930), *were* consistent with WTO rules on subsidies and countervailing measures, contrary to Canada's claim.⁶⁵

August 29, 2001: The US imposes a provisional CVD of 19.3%. All Canadian exporters must pay this tax into a trust fund, and await a final decision by the US ITC *a year later*. When this decision is made, *any, all or none* of the taxes collected might be returned to the Canadian exporters.

October 2001: In addition to the CVD, an ADD of 12.6% is imposed, also preliminarily, subject to a full investigation. Hence Canadian exports faced an uncertain market price in the US. Suppose the US market price is about \$330 per thousand board feet (tbf). After review by the US ITC, the amount received by the Canadian exporter could be anywhere from \$230 to \$330 per tbf. Clearly this is the difference between a healthy profit and a substantial loss.

March 2002: The Commerce Department announces its final determination on subsidies (18.8%) and ADD (from 2 to 14% for selected individual companies, and 8.43% for all others. Hence the typical total tax facing Canadian importers from Western Canada to Quebec is 27.2%.

May 2, 2002: In a compromise that angers both sides, the US ITC announces that: 1) There is no proven injury to US producers, hence all duties collected in the trust prior to this date would be returned to Canadian producers, *but* 2) there is *threat* of injury to the coalition of 779 US lumber producers who filed the complaint. Hence the combination of CVD and ADD duties totaling 27.2% are upheld. Yet these duties were scheduled to take effect in three weeks. This delay, meant to motivate intensive bilateral negotiations to solve the problem, instead created a free-for-all as Canadian producers had three weeks to export, in the words of US industry "Every stick of wood in the country" duty free before the new duties were imposed.

June 2002: Prices in the US remain low, due to the May import surge. Mill closures in the southern US trim production by 20 million board feet, but experts say industry overcapacity is a *billion* board feet per year. At \$300 per tbf, some companies say they are \$100 below long-run profitability.

July 26, 2002: In a decision with interesting implications for the timing of trade actions and remedies, the WTO announces that the *preliminary* CVDs announced by the Commerce Department in May of 2001, which had already been replaced by the ITC's ruling in May 2002, were inconsistent with WTO rules. While having no direct impact, it suggests that Canada's pending WTO challenge to the final CVD duties will be upheld. But that decision is not expected until sometime in 2003.

September 20, 2002: As of this writing, talks between the two countries are scheduled to resume on this date. Both sides are pessimistic that a negotiated settlement can be reached.

Spin City: Lobbying efforts and coalitions

Home builders, in testimony to the Senate on Feb. 13, 2002, said these "protectionist measures represent a new hidden tax on American home buyers, renters, and consumers..."⁶⁶ Their message is three-fold.

⁶⁵ ICTSD Bridges, July 10, 2001 at <http://www.ictsd.org/html/weekly/10-07-01/story6.htm>

⁶⁶ The quote and the kernel of the arguments below are from <http://www.nahb.com/news/senatelumber.htm>

1. Industries that *use* softwood lumber employ 30 times more US workers than lumber *producing* industries, with the implicit message that these workers are also voters and that it is in the political interest of politicians to oppose the duties.
2. Based on some rule of thumb calculations, starting with an average of 15 tbf of lumber per new home, they say that each \$1 increase in the price of lumber raises the cost of a new home by \$20. They then predict that the 27% tax will raise the price of new homes by about \$1,500 (which would be true, based on the \$20 figure above, if the tariff increased softwood lumber prices by \$75 from \$280 per tbf, about 27%). Continuing the logic, they say that this \$1,500 increase would prevent 450,000 potential home buyers from qualifying for a mortgage (“denying them the American dream of home ownership”). They further note that increased home building and home sales is one of the few bright spots in a stagnant US economy, implying without stating that the trade restrictions could plunge the economy back into recession.
3. Their third main point is that US producers needn’t worry, since Canadian softwood lumber is a different product (read imperfect substitute) from softwood lumber from the Southeastern US. In fact, by saying that spruce and white pine from Canada are better suited for framing, while Southern yellow pine is used for beams, joists, and outdoor applications, they hint that Canadian softwood lumber is really a *complement* for some types of US lumber. They continue by doubting demand for Southeastern lumber will increase substantially as a result of the tariffs, citing imports from other sources, engineered wood products, and steel framing as likely beneficiaries.

Each of the three arguments above sounds convincing, with the additional appeal of unspecified benefits of free trade. Closer inspection, however, shows some inconsistencies between them. The most notable inconsistency is between points two and three; if US and Canadian softwood lumber are not close substitutes, then prices in the US market will not rise by anywhere near 27%, and the negative impacts on housing prices and consumers will not take place.

The Canadian government and lumber industry launched a joint “education program” aimed at US consumers, with the government footing the \$13 million bill. Pamphlets, written by Canada’s lumber industry, are handed to border crossers. They explain that consumers are ignorant dupes, being exploited by “a few well-heeled American industrialists with political connections.”⁶⁷ It is interesting to note, however, that a completely different message, about nationalism and jobs, was conveyed to returning *Canadian* residents and citizens in a second pamphlet.

Evaluating the current impasse, its likely impact on stakeholders, and steps toward resolving the dispute

As of this writing, Canadian softwood lumber exporters face tariffs of 27.2%, combining the CVD and ADD. It seems likely that the US will have to rethink these tariffs in 2003, following the final WTO determination, but what will the impact of the tariffs be on the US in the meantime? How do these impacts compare with those of the SLA? How will Canada and forestry-dependent provinces in Canada be affected?

We can break the impact on the US economy down into the impact on lumber prices, the impact of higher lumber prices on production and employment of the US softwood lumber industry, the cost to consumers of higher prices, and the deadweight social loss associated with the protection. But we

⁶⁷ Mick, H., “Lumber war goes to border,” Vancouver Sun, Monday May 27, 2002. Available on-line at www.Canada.com.

$$\text{Area b} = \frac{1}{2} * (35\text{bbf}-30\text{bbf}) * (380\text{tbf}-\$330\text{tbf}) = \$125 \text{ million}$$

$$\text{Area d} = \frac{1}{2} * (62\text{bbf}-54\text{bbf}) * (380\text{tbf}-\$330\text{tbf}) = \$200 \text{ million}$$

are the deadweight social loss triangles, a reduction in consumer surplus that benefits no one.

Area c = $(54\text{bbf}-35\text{bbf}) * (380\text{tbf}-\$330\text{tbf}) = \$950$ million is the transfer of what would have been US government revenue under an equivalent tariff to all foreign producers. A portion of this, namely

$$c1 = 14.7\text{bbf} * (380\text{tbf}-\$330\text{tbf}) = \$735 \text{ million}$$

goes to softwood lumber producers in the four affected provinces. These benefits must be weighed against the losses from selling the rest of their production at the depressed world price. However, since 65% of all production is sold to the US, we roughly estimate the loss on the other 35% of production (around 8bbf) at

$$8\text{bbf} * (\$315\text{tbf}-\$330\text{tbf}) = -\$120 \text{ million, for a net gain of over } \$600 \text{ million.}$$

Hence we estimate the total loss to US consumers is $a + b + c + d = \$2,900$ million, or nearly three billion dollars.⁶⁸ Similarly, once we subtract the gains to US producers, we are left with the net loss to the US, consisting of the combination of deadweight social losses and transfers to foreign producers. This national loss is $\$2,900 \text{ million} - \$1,625 \text{ million} = \$1,275$ (as proponents of free trade, we might say “well over a billion dollars,” or if we were feeling bold, perhaps “nearly \$1.5 billion.”)

How would the above case be different if the US had imposed CVDs and ADDs on lumber from the four provinces totaling just over 20%, holding constant the impact on prices and quantities? The only important difference, assuming that other exporters were not affected, is that areas c1 and e1 in the above figure become US government revenue, hence the net impact on the US as a whole becomes $e1 - (b+d)$, or

$$(\$330\text{tbf}-\$315\text{tbf}) * 14.7\text{bbf} - \$325 \text{ million} = \$220.5 \text{ million} - \$325 \text{ million} = -\$104.5, \text{ a loss of about } \$100 \text{ million, just a tiny fraction of the national loss to the VER.}$$

Let’s consider one additional way to evaluate the impact of trade restrictions on the profitability of a firm or an industry. In theory, the best way to make such an evaluation is to consider not just current profits, but the *present value* of all future profits.

The concept of present value (or *net* present value, when considering the sum of both positive and negative future payments) recognizes that a dollar today is more valuable than a certain dollar in the future, for two basic reasons. One, rising prices will reduce the purchasing power of money in the future, in most cases. This is handled by dividing by expected inflation to make the numbers real values. Secondly, firms and individuals generally prefer to enjoy today, because tomorrow may never come, or may come without you, which is, for you, much the same thing. This preference, all else being equal, of enjoying consumption today rather than deferring gratification is called the *time value of money*. Hence the discount rate, the extent to which consumption today is preferred to consumption tomorrow, in percent, is used to convert a future payment, or stream of future payments (such as expected profits) into a single value in current dollars.

⁶⁸ Rounding numbers for use in policy discussions is done for two main reasons. First, it avoids the impression that you are making a false claim of detailed accuracy. Given all the assumptions in making those calculations, are they likely to be correct to the nearest million? Never. The nearest billion? Maybe. Secondly, it gives opponents or proponents of a given trade policy the opportunity to round the numbers in a way that makes their case appear stronger!

Making such calculations yourself would be quite complex. Fortunately, these calculations are made everyday by buyers and sellers in the stock market. Hence changes in stock market prices and valuations can be used as a proxy for the impact of trade policy changes, assuming, as always, all else remains unchanged.

In the softwood lumber case, consider US producer Plum Creek, one of the members of the US lumber coalition mentioned above. How has their share price and corporate valuation changed with the varying trade systems?

Their share price was fairly stable at \$26 in late 2000, early 2001. It fell sharply to \$23 with the anticipation that the end of the VER would provoke a surge in imports and fall in prices. The share price then quickly rose to \$28, following the subsidy and dumping charges, investigations, and preliminary findings of the Commerce Department. After peaking at \$32 briefly, the share price sagged to \$25 as of September 2002, with the final ITC finding that injury had not taken place and the WTO panel decisions that calls into question the continuation of the current CVD. With 185 million shares outstanding, each \$1 fluctuation in share price changes the value of the firm by nearly \$200 million, reflecting revised expectations about the ongoing profitability of softwood lumber production in the US.

Resolving the dispute

Despite the scheduled resumption of talks, a quick resolution to the dispute seems unlikely. The softwood lumber industry in the US, particularly in the Southeast, is extremely well-organized and politically connected. If US consumers and government officials were willing to accept the \$1.25 billion dollar welfare loss of the VER, the \$100 million or so loss of the CVD and ADD restrictions is not likely to provide a domestic backlash. While a strong argument can be made for the Canadian softwood lumber companies to accept another VER-type arrangement, there is substantial pressure from provincial governments to push for free trade. Free trade would create more production and more employment, though probably not more profits.

For example, private sector forecasts of economic growth for British Columbia (BC) indicate that the lumber tariffs will reduce economic growth by between 1 and 1.5% in 2003. Lumber supply is expected to fall by about 15% (which implies a PES of just over $\frac{1}{2}$), and employment is forecast to be lower by 23,000 jobs. A government study predicts job losses of 20,000 in the forestry/lumber sector itself, with an additional 30,000 indirect job losses for a total of 50,000.⁶⁹

Canada could, of course, comply with US pressure to eliminate the export restriction on logs and to auction rights to cut on public lands, allowing the most efficient sawmills on both sides of the border to prosper (and forcing inefficient mills to close). Such auctions and free trade in both logs *and* lumber would have the additional benefit of raising additional money for conservation and replanting programs in Canada's government forests. Consumers in the US would benefit from lower lumber prices. While clearly the preferred method in terms of economic efficiency, this policy would face tough political opposition in Canada, led by Canadian sawmills concerned with job losses to the US.

⁶⁹ Recall from Chapter 6 that the normal rule of thumb for indirect job losses is 2. The lower multiplier of 1.5 used here may reflect three factors: 1) machinery and equipment used in logging and sawmills are capital intensive, 2) some of this equipment is imported from the US, hence the jobs lost from decreased demand are not all Canadian, and, most importantly, 3) lower lumber prices in Canada will *increase* output and employment in the construction sector. Indeed, "Rising housing sales and starts are responsible for much of B.C.'s economic growth this year and will be to a lesser extent in 2003".

Another option for Canada to pursue unilaterally is an export tax, like the tax that applied to exports from the four provinces in excess of the 14.7bbf limit. This would convert US tariff revenues to Canadian government revenues, but would not bring the production and employment benefits the Canadian government seeks.

The final option for Canada is to continue to battle the US in NAFTA and WTO dispute resolution panels. Yet we have learned (in part from recent experience with steel tariffs) that temporary protection can always be achieved, even if the protecting country is clearly in violation of WTO rules and international norms. Final determination by the WTO panel in softwood lumber may come as late as 2003, and the US response at that point may be to change the system, but not the extent, of protection once again. To push for free trade, the Canadian government could be more aggressive both in coalition building with logical US partners and in its efforts to educate Americans about the cost of protection. But, at least for 2003, no major changes in the status quo should be expected.

CHAPTER 8 ESTIMATING THE IMPACT OF EXCHANGE RATE CHANGES ON THE PRICE OF IMPORTED PRODUCTS AND ON TRADE IN SUCH PRODUCTS

Why Worry About Exchange Rates?

In today's globalized world, trade and investment flows are affected greatly by international economic shocks, such as large or prolonged changes in the exchange rate. Indeed, changes in exchange rates often have a greater impact on trade flows and the fortunes of individual industries than a negotiated trade agreement. As trade volume increases, national economies become even more vulnerable to such shocks. In such situations trade officials, industry associations, and corporations must understand the reason for those exchange rate movements, to calculate their impact, and in certain instances, to lobby for macroeconomic policy reforms to correct serious exchange rate imbalances.

The greatest concern to commercial diplomats is a sudden and large appreciation of a country's own currency, or a sudden and large depreciation of the currency of a major trading partner.⁷⁰ Appreciation makes a country's exports less price competitive in foreign markets and makes imported goods cheaper in the domestic market. Whenever that happens, government trade officials and those responsible for trade policy issues for industry associations and corporations need to project the impact of such exchange rate movements on trade in individual products and/or trade as a whole. Trade experts in industry need such calculations to help corporate executives understand how the rate movements will affect their fortunes, and to lobby those officials who have the means to influence exchange rates, namely, officials in the Treasury and Federal Reserve Board in the US, and officials in Finance Ministries and Central Banks elsewhere.

In the first section of this chapter we will examine the process of calculating the impact of exchange rate movements on trade volume, trade revenue, exporter profits, and jobs in the export sector. In the second section we will review the major reasons for exchange rate movements, and what macroeconomic officials can do about it.

Calculating the Impact of Exchange Rate Movements

In calculating the impact of currency changes on trade we must resort to the price elasticities discussed in Chapter 3. Of course, if we want to calculate the impact for all traded products rather than an individual good or service we must identify a weighted average price elasticity that blends all of a country's goods and/or services.⁷¹ In addition, we must factor in time, because the full impact of a currency change in most cases is delayed for reasons we will explore below. Also, we need to consider aggregate income elasticities, because currency changes are often associated with large

⁷⁰ We say a currency *appreciates* when it becomes more valuable relative to another currency. But how do we measure the value of a currency? It is measured by how much of another currency each unit of the original currency can purchase. So if the US dollar goes from 100 Yen/\$ \rightarrow 120 Yen/\$, it has *appreciated*, because the dollar can now buy *more* of the other currency. A move from 120 Yen/\$ \rightarrow 100 Yen/\$ indicates a *depreciation* of the dollar.

⁷¹ For instance, policy makers considering an adjustment of a fixed or pegged exchange rate should consider the average elasticity of imports and exports and thus the impact of devaluation on the trade balance.

changes in a country's income and the effect of these income changes can swamp the price effects for certain industries.⁷²

The most direct way exchange rates influence trade flows is by influencing the price-competitiveness of exports and the affordability of imports. If a country's exchange rate is depreciating (falling in value relative to the currencies of its major trading partners), then that country's exports will become more price competitive (their exports will become cheaper to the rest of the world). Over time, this leads to an increase in export volume, provided that the price elasticity of demand for the country's exports is sufficiently elastic (i.e., if the price of exports falls, then consumers abroad are very responsive and buy more of those exports).⁷³ But just as depreciation and devaluation⁷⁴ make a country's exports more price-competitive, they make the country's imports more expensive.

Factoring Time into the Calculation of the Trade Effects of Currency Changes

Businesses dislike uncertainty and unpredictable events beyond the vagaries and fickleness of consumers and markets. One defensive action they take to ensure themselves against sudden and unexpected changes in the value of their own currency is buying foreign currencies for future delivery on the forward market if substantial foreign currency expenditures are planned. Likewise, they will sell on the forward market if foreign currency revenues are anticipated. While it costs them to buy on the forward market, they are assured that within a particular period they can "lock-in" domestic currency costs of future foreign currency expenditures and revenues at the current rate. However, if the market also anticipates the currency appreciating in the future, then forward rates will reflect this. So using the forward market only protects against extremely short-term exchange rate fluctuations.

Another defensive action is to leave the price in the foreign market unchanged, and to absorb the reduced value of the foreign currency receipts in profits. For example, if a \$10 bottle of California wine sold for 1000 Yen when the exchange rate was 100 Yen/\$, then prices would have to rise to 1200 Yen if the dollar appreciates to 120 Yen/\$ to leave profit margins unchanged. Alternatively, the California wine exporters could continue to sell their wine at 1000 Yen/bottle, which would cut into their profit margin by 200 Yen or \$1.67 per bottle. They could do this to protect market shares abroad and to avoid confusing their customers abroad with erratic price changes. Of course, they can take such actions only for so long, usually no more than a year or two. The full effect of an appreciation of an exporting country's currency or a depreciation of an importing country's currency on prices charged for exported goods and services in the foreign market is thus delayed, as is the impact on trade volume.

Exporters are not the only ones affected by a sudden appreciation of the country's currency or a sudden depreciation of a foreign country's currency. These changes make imports cheaper, and persuade domestic consumers to switch from domestic products to imported products, leading to a

⁷² Consider, for instance, the contraction in income in Argentina in 1999 and 2000, following the massive devaluation in Brazil. Argentine producers faced a collapse in demand for their traded products, as consumers in both Argentina and the rest of Mercosur (primarily, of course, Brazil), shifted their demand to cheaper, Brazilian-made products. This impact was reinforced, and in some cases dominated, by the fall in income associated with rising unemployment and falling output, which hurt even producers of non-traded goods and goods for which there were no close Brazilian substitutes.

⁷³ If the price-elasticity of demand for the country's exports is very *inelastic*, then consumers abroad will not change their consumption habits much in the face of changing prices.

⁷⁴ Depreciation and appreciation are defined as decreases or increases in the value of one's currency in a *market-determined*, flexible exchange rate system, while devaluation and revaluation are policy-induced, one-time decreases or increases under a fixed or managed exchange rate regime.

loss of revenues, profits, wages and jobs in these domestic industries. The impact of such currency movements on import-competing industries may also be delayed because foreign producers may take some time to increase their production capacity or divert goods from their own market to foreign markets. Also, domestic consumers may take time to adjust consumption towards imports.

In the short run, the delayed response to exchange rate changes can lead to an exacerbation of an existing trade deficit, but in the long run, if consumers curtail their import demand as import prices rise, then the trade balance improves. This is known as the “J-curve effect,” with the downward part of the “J” representing the short-term deterioration of the trade balance, and the upward portion of the “J” simulating the long-run improvement.

Figure 8-1 The “J” curve.

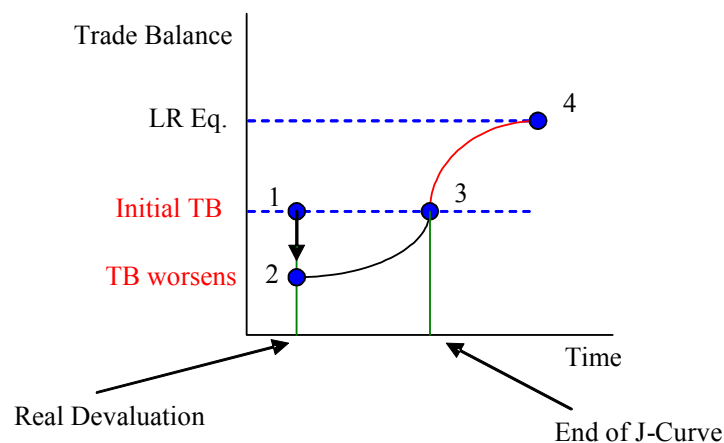


Figure 8–1 shows the evolution of the trade balance following an exchange rate devaluation. The initial impact of devaluation is to worsen the trade balance (1 to 2). As time passes, quantities adjust, and the trade balance improves, passing the old level (point 3) on the way to the new LR equilibrium at point 4.

To illustrate how price-competitiveness changes with exchange rate movements over time, let’s take the example of US vehicle imports from Canada. In 1997 the US imported US\$20 billion worth of large passenger vehicles from Canada.⁷⁵ This works out to approximately 1 million vehicles if we assume an average price of \$20,000. Also, between 1997 and 1998 the Canadian \$ depreciated against the US\$ from US\$0.70/C\$ to US\$0.60/C\$.⁷⁶

What are the impacts of this depreciation on the value of Canadian vehicle exports to the US:

- In terms of C\$?

⁷⁵ Source: US Department of Commerce. “Passenger motor vehicles with spark-ignition internal-combustion reciprocating piston engine, cylinder capacity over 3,000 cc.”

⁷⁶ When discussing changes in the value of a currency, in this case the Canadian dollar, it is best to have that currency in the denominator. The numerator represents the “price” of that currency in terms of another currency. Since the price, in this case, is falling from US\$.70 to US\$.60, then the value of that currency (C\$) must be falling.

- In terms of US\$?
- Three months from now, before sales volumes adjust?
- Nine months from now, after sales of Canadian vehicle exports likely increase?
- Three years from now, after additional adjustment takes place?

From the perspective of the Canadian exporters, if they keep the average price of vehicles fixed at US\$20,000, the value in C\$ of vehicle exports to the US actually increases.

$$\begin{aligned} \text{In 1997, revenue in C\$} &= (\text{US\$ price of car/exchange rate}) * (\text{number of cars}) \\ &= (\text{US\$20,000 per car}/0.7) * (1 \text{ million}) = \text{C\$29 billion} \end{aligned}$$

$$\text{In 1998, revenue in C\$} = (\text{US\$20,000 per car}/0.6) * (1 \text{ million}) = \text{C\$33 billion}$$

Suppose the Canadian exporter is less interested in increasing profit margins and more interested in increasing market share. Perhaps s/he will keep the average price of vehicles fixed in C\$ at the 1997 price C\$29,000. In this case, selling the same amount of vehicles (1 million) the following year will yield the same amount of revenue (C\$29 billion). But will the Canadian exporter still sell only 1 million vehicles?

The price of Canadian-made vehicles paid by US importers will fall. If the average price remains at C\$29,000, the price in US dollars will fall from US\$20,000 to US\$17,400. This may cause US importers to increase the number of vehicles they import from Canada, because now vehicles made in Canada are more price-competitive than US-produced vehicles. But this takes time. Some of this may happen within just one year if Canadian factories can hire and train new workers, install new machines, and expand existing distribution channels. But this kind of adjustment may take longer than one year, perhaps as long as three years. In the end, however, sales volume to the US will increase.

Over 3 months, with inelastic demand (0.25), a 13% change in price, and a $(13\%)*(0.25)=3.25\%$ change in quantity, the new sales volume will equal 1,032,500.

Export revenue = $1,032,500 * \text{C\$}29,000 = \text{C\$}29.943 \text{ billion}$, or US\$17.966 billion, which is less than before the depreciation.

After 9 months, demand is more elastic (0.8). Repeating the calculations gives us a 10.4% increase in demand, yielding C\$32 billion or US\$19.2 billion.

Finally, after three years, the Canadian exports may see elastic demand (1.2). Repeating the calculations gives us a 15.6% increase in demand, and increased revenues in both Canadian (C\$33.5 billion) and American dollar terms (US\$20.1 billion).

The end result is that Canada's trade balance with the US is likely to improve as US firms import more Canadian products (because Canadian products are more price competitive), and as Canadian firms import fewer US exports (because US products are less price competitive).

As a general rule, currency depreciation improves a country's export price-competitiveness in the short-medium run, and eventually improves the country's trade balance (1 to 3 years). There are always exceptions to this rule, especially if the price elasticity of import demand and/or price elasticity of export demand are extremely inelastic. But for the most part, the rule holds true.

This phenomenon happened during the Asian financial crisis after 1997. The currencies of most Asian countries depreciated significantly against the US\$ between 1997 and 1998. US manufactured goods and commodities became very expensive to Asian consumers, and Asian products less

expensive to American consumers. The result was a widening trade imbalance between the US and Asian countries, as American consumers binged on cheap Asian imports and Asian consumers curtailed their consumption of increasingly expensive American goods and services.

Illustrating this phenomenon is the example of the US and Thailand. Before July 1997, Thailand pegged its currency, the Thai baht, at 25 baht/US\$. After July 1997, the currency collapsed to 50 baht/US\$. Consider the implications. From the perspective of a Thai consumer, US products are now twice as expensive. The \$20,000 US-made automobile import, which was 500,000 baht before the crisis, is suddenly 1,000,000 baht. From the perspective of a US consumer, a teak table previously costing \$2000, is now selling for the bargain price of \$1000.

The same phenomenon happened with the Euro between 1999 and 2000. During this period the value of the Euro fell from \$1.15 to \$.83. Some of this depreciation was expected, and reflected underlying economic fundamentals. But most economists believed that the euro was “overshooting” its more appropriate, long-run equilibrium rate against the dollar, i.e., they felt the Euro was undervalued by as much as 20%.⁷⁷

What does a **20% under-valuation** imply? European products exported to the US will have a **20% price advantage**. Consider the following example.

In 1999 a piece of equipment, manufactured in France and priced at 1,000 Euros, could be exported and sold in the US for \$1,000 (when the Euro was at par with the \$). But suppose the Euro depreciates from US\$1/Euro to US\$.80/Euro. This is a 20% depreciation, which results in a 20% reduction in price for US consumers. The 1,000 Euro product can now be sold in the US for US\$800.

European exporters and US domestic competitors can respond in a number of ways to this exchange rate shift. For European exporters the choices include:

- 1) Continue to sell their products at a fixed Euro price, and hope that the lower US\$ price will help them increase their US market share, perhaps even driving some of the less-efficient US manufacturers out of business.
- 2) Increase profit margins by selling their product to US importers at a price of 1,250 Euros, in which case their product in the US market will still be valued at US\$1,000.
- 3) Some combination of the two choices above, such as selling their product for 1,100 Euros (increasing their per unit profit margin by 100 Euros), while still maintaining a price advantage (US\$880) thereby still allowing them to increase their US market share.

Domestic manufacturers in the US can respond in the following ways:

- 1) Leave prices unchanged and risk losing market share to European competitors.
- 2) Reduce profit margins to the point where they still compete with European imports.

The choice for US manufacturers is not easy. This was the dilemma faced by Caterpillar, the US heavy equipment manufacturer, in the early 1980s when the US dollar was overvalued against all other major currencies. At that time, the Yen was selling at a rate of 250Y/\$. This made the exports of Caterpillar’s main rival, Japanese Komatsu, significantly more price competitive in the US and third-country markets. Boosted by this price advantage, Komatsu decided to export a full product

⁷⁷ As predicted in the first edition, written in the summer of 2001, the Euro has recovered against the dollar. As of September 2002, the Euro exchange rate is \$0.98.

line to the US market. Caterpillar eventually responded by lobbying policy makers in Washington, D.C. to work with other central banks to reverse the appreciation of the dollar through a change in the balance of monetary and fiscal policy.⁷⁸ In September 1985 their efforts bore fruit. G5 finance ministers and central bankers met in New York and agreed to intervene on world currency markets to reverse the dollar's appreciation. This came to be known as the Plaza Accord, and the US\$ rapidly depreciated to new lows. Caterpillar suddenly had the price advantage.

The ballooning US trade deficit (from \$25 billion in 1980 to \$122 billion in 1985) was worrying to both US and international policy makers, motivating this coordinated intervention. Despite this intervention, the US trade deficit continued to worsen over the next two years, peaking at \$160 billion, illustrating the "J-curve" effect discussed above. One might wonder if today's \$400 billion US trade deficit would trigger a comparable internationally coordinated intervention. Policymakers like former Treasury Secretary O'Neill would say that the current situation is fundamentally different, since it has been caused not by a domestic imbalance, but by an inflow of foreign investment, demonstrating international confidence in the US economy. The distressing part of the picture in 2002 is not a government deficit, but a collapse of private savings. The alternative, whose seeds may have been planted, (steel, agricultural subsidies, WTO ruling on the US foreign sales corporations), is a global trade war.

Exchange Rates and Protectionism

Caterpillar's tactic of lobbying for an exchange rate correction is something only large companies or industry groups can contemplate. Caterpillar had two other advantages. It was not alone in this lobbying effort, and its objectives fell in line with US macroeconomic policy interests, although not with the fiscal policy of the time. Except in situations where the government can adjust its monetary/fiscal policy balance, a shift in exchange rates through policy change is not easily viable in today's rapidly expanding foreign exchange markets. Central banks have less influence over free-market exchange rates than ever before, as the amount of intervention they are capable of risking pales in comparison to the massive volume of foreign exchange traded on a daily basis.

So if lobbying for exchange rate realignment is not an option, what do firms and industry groups typically do when a currency is overvalued? They often issue *dumping* complaints.

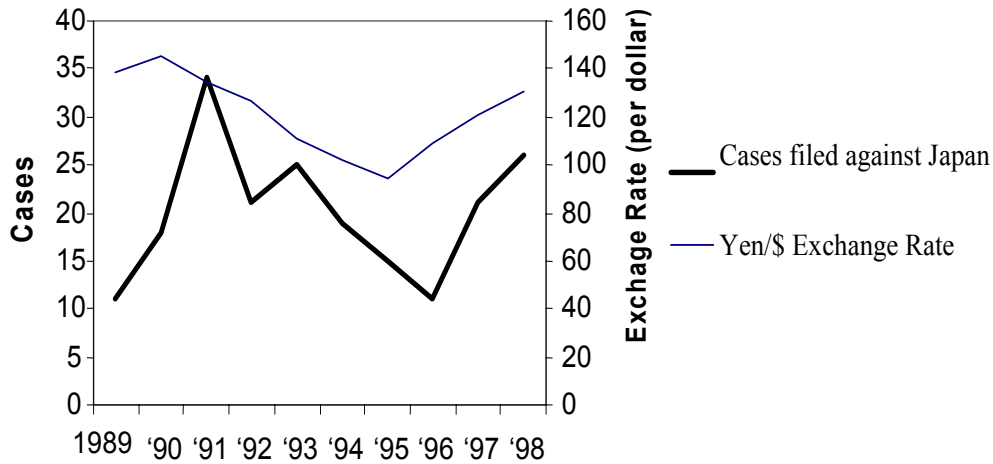
There are two definitions of dumping. First, the 1974 Trade Act in the US defined dumping as selling at below the cost of production in export markets. This definition has evolved in practice to a broader definition which focuses on export price relative to price in the domestic market, regardless of production costs. Economic theory supports laws based on the first definition but not the second.

Whenever a currency is significantly overvalued (or when a currency continues to appreciate for an extended period of time), dumping complaints rise. Figure 8–2 shows the fluctuation in anti-dumping cases filed against Japan during 1990 and 1998, as the dollar weakened, and then strengthened. The strengthening yen gave Japan a break from dumping charges through 1996, after which the dollar strengthened again, and dumping charges surged. Other East and Southeast Asian

⁷⁸ They argued (correctly) that the overvalued dollar was the result of a combination of tight (contractionary) monetary policy and loose (expansionary) fiscal policy. Reducing government spending (or raising taxes, though that measure can be very difficult politically), they said, could be combined with a monetary expansion to weaken the dollar and restore the competitiveness of the best US exporters, without being inflationary.

nations had greater currency depreciation against the dollar in 1997 and 1998, and suffered an even greater increase in dumping charges.

Figure 8-2 Exchange Rate and US Antidumping Cases



The reasons for these charges are easy to appreciate. When a currency is overvalued, foreign exporters have a distinct price advantage over the domestic import-competing producers of those same products and services. In this case, the price advantage may only be the results of the exchange rate imbalance, not the result of price discrimination or *predatory pricing strategies*.

Predatory pricing refers to the practice of setting prices below one's cost of production to drive financially weaker competitors out of business, after which prices are raised to monopoly levels, and losses recouped. This strategy works only in industries characterized by imperfect competition, such as barriers-to-entry.

The cause of the price advantage is of little interest to the domestic competitors. They feel threatened by low-priced imports, regardless.

So how do they fight back? Waiting for exchange rates trends to reverse is not an option for most industries. Filing a dumping complaint is. The likelihood of having a complaint settled in an industry's favor is quite good.⁷⁹ Hence, there is a strong correlation in the above diagram between dollar appreciation and increases in dumping complaints filed by US industries.

One way to stem this wave of protectionism (in the form of anti-dumping duties, countervailing duties, etc.) is for the government to aim for more active exchange rate management, along with better coordination of monetary and fiscal policies.⁸⁰ But this is not an easy task. More appealing, but no less difficult in practice, would be international agreements that limit the variation in exchange

⁷⁹ Fifty to sixty percent of all complaints yield dumping duties, and even in cases where the ultimate finding is that dumping either did not take place or that domestic firms were not materially injured, import prices are observed to rise during the course of the investigation!

⁸⁰ In the case of the United States, the Central Bank manages international reserves and the money supply, but it can be influenced by the President through the Department of the Treasury.

rates among the major world currencies.⁸¹ The best fix for large exchange rate misalignments may be to prevent them from occurring in the first place.

But international policy coordination is also a difficult task. Such international agreements limit domestic policy choices. Different countries have different priorities, and the domestic economic situation almost always takes precedence over external imbalances. Leadership changes occur, and new leaders may not honor international commitments made by prior governments. Nationalistic leaders may denounce the real or apparent constraints to national sovereignty from international agreements and commitments.

*Factoring Income Changes into the Calculation of the Trade Effects of Currency Changes*⁸²

One of the reasons a country's currency may appreciate is that its government has been successful in its economic policies, attracting large amounts of foreign capital.⁸³ In this situation the boost in domestic growth and income increases the desire of domestic consumers to buy more products, including imported products. Being wealthier, such expensive foreign products as foreign liquor, gourmet delicacies, sports cars, designer shoes and handbags hold a special appeal. In this case the income effects exaggerate the price effects on trade. Domestic buyers buy more foreign goods not only because they are cheaper, but also because the consumers feel they can afford to buy more imports, which are particularly attractive, due to perceived higher quality, status, etc. Exporters, on the other hand, are less compelled to export because they can sell all they can produce at home. While the impact on trade in this case is large, it does not create much concern for domestic producers and is unlikely to become an issue for commercial diplomats.

Conversely, the reason another country's currency may depreciate is because its government has been unsuccessful in its economic policies, and investors, both domestic and foreign, are fleeing the country. This was the case in Mexico 1994–1995, the Asian financial crisis of 1997–1998, in Brazil and Russia shortly thereafter, Turkey in 2000 and Argentina in 2001–2002. The fall in domestic income makes people less willing to buy foreign products which may be more expensive than domestic substitutes, even if the domestic substitutes are less attractive. The income effects exaggerate the price effects on imports, but with less happy results for domestic exporters and producers of import competing goods. In this case, with exports prohibitively expensive, a country cannot manipulate its own macroeconomic policies to correct the situation. It may, however, have added reasons for helping the affected foreign countries get back on their feet.⁸⁴

⁸¹ Some leading economists claim that the problem in Southeast Asia was not that the Thai Baht and other currencies were pegged to the US dollar, but that the Yen was *not*.

⁸² The concept of income elasticity of demand was introduced in Chapter 3.

⁸³ There are a number of other policy-induced reasons as well as totally non-policy related reasons why exchange rates might change, and these are explored more fully at the end of this chapter.

⁸⁴ US interest rate cuts in the second half of 1998 were motivated in large part as an attempt to halt the spread of financial market panic from the Asian crisis. "Yesterday's move amounted to the 'most internationally driven rate cut since 1927'...said David Hale, chief economist at Zurich Kemper Investments." (Financial Times, September 30, 1998)

Impact of Exchange Rates on Investment Decisions and Trade-Related Jobs

Returning to the Komatsu-Caterpillar case mentioned earlier, Komatsu did not stand idly by to watch its market gains disappear back in the 1980s as the Y/\$ rate collapsed from 250 to 150. This shift in exchange rates quickly made Komatsu equipment 40 percent more expensive. Instead, Komatsu responded by altering its investment decisions, setting up a joint venture with Dresser Industries (a US corporation), and opening a manufacturing plant for its heavy equipment in the US. Komatsu hoped that their US plant would not only produce for the US market, but also produce equipment for export to the rest of the world. Komatsu ultimately had manufacturing facilities in Japan, North America and Europe. Their corporate strategy was to shift production back and forth between these facilities in accordance with changing global demand and changing exchange rates.

Consider the implications: If exchange rates reverse again and the dollar appreciates against the Yen, as it did again in the early 1990s, then producing Komatsu equipment in the US market is no longer so advantageous. The result is worker lay-offs and possibly plant closures. The adjustment costs for workers can be significant.

In 1994–95, the US dollar once again went into a tailspin, at which point it once again became advantageous for foreign companies to produce their products in the US (to avoid the price disadvantage of a low dollar and high Yen and DM). But this means opening closed factories, training new workers, etc. There is a lag between making the decision to shift production and getting new production underway. And what if the exchange rate reverses once again? Well, it did this time. Thanks to the collective efforts of several central banks, and a strong run of productivity, economic growth, and foreign capital inflows, the dollar recovered in late 1995 and appreciated against the Yen and DM.

Exchange rate policy, to the extent that the key currency nations have such policies, is more the responsibility of Finance Ministries and Central Banks. Nonetheless, trade policy advocates can play a role in shaping such policy by pointing out the adjustment costs involved with rate instability and the impact on domestic producers and the overall trade balance when a currency is overvalued. Short of returning to a fixed or managed exchange rate system, monitoring rates and understanding the relationship between exchange rate variation and calls for protection is the best trade policy analysts can do.

Factors Influencing Exchange Rate Movements

There are many factors that influence exchange rates. Some of these factors are directly related to domestic policy changes and events, some are related to events and policy changes in foreign countries, and other factors are simply influenced by future expectations of what might happen. Below are some of the most important variables on the value of a country's currency, and what macroeconomic officials and commercial diplomats can or cannot do about them.

1. Relative Real Interest Rates

Real interest rates are simply nominal (published, market) rates, corrected for inflation. Relative real interest rates are a reference to domestic real interest rates relative to foreign real interest rates. So if real interest rates fall in the US and remain the same in Canada, we can say that the Canadian real interest rates have risen relative to US rates, or that US rates have fallen relative to Canadian rates.

A relative rise in real interest rates is strongly correlated with an appreciation of a country's currency. Likewise, a relative fall in real interest rates is strongly correlated with a depreciation of a country's currency. A rise in interest rates will encourage domestic investors to repatriate money back to the home country, which would involve selling off foreign currency and buying domestic currency. And

it will encourage foreign investors to purchase interest-bearing investments in the home country, which will also involve selling off foreign currency and buying domestic currency. These actions will cause the home country's currency to appreciate relative to foreign currencies.

The baseline interest rate is set by the Central Bank in most countries. In the US, the Federal Reserve makes all interest rate decisions, independent of the executive branch of government. Their central mission is to judge on the basis of numerous economic indicators and forecasts whether monetary policy should be tightened or loosened. Different central bankers may target different indicators, such as inflation targets, interest rate targets or money supply directly. Their goal is to contain inflation, while also keeping an eye on unemployment. However, international economic theory indicates that if a country's currency is pegged to another country's, then no other macroeconomic variable can be controlled.

It is important to remember that the US Federal Reserve is an independent entity, impervious to outside lobbying efforts. There is little that a trade policy official or industry representative can do to influence monetary policy, per se. But there is much that a trade policy official can do by closely following actions and trends in both monetary and fiscal policy, with an eye to how those actions influence future exchange rate movements. The official can interject trade-related concerns into internal policy debates.

Where policy analysts and lobbyists can play a role is with fiscal policy proposals that independently put pressure on interest rates. For instance, tight fiscal policy (a tax increase, and/or a reduction in government spending) is likely to ease pressure on interest rates; i.e., interest rates are likely to remain low. But a loose fiscal policy (tax cuts, and/or increased government spending) is likely to put upward pressure on interest rates. In countries like the US with an independent central bank, this results in what economists call indirect *crowding out*. Crowding out takes place when increased government borrowing reduces funds available for private investment, thus driving up the interest rate. In countries without an independent central bank, crowding out is direct, as the banking system funds the government's deficit. Either type of crowding will likely lead to a currency's appreciation, eroding the price-competitiveness of exports, and increasing the price-competitiveness of imports.

2. *Currency Interventions*

Although most central banks are fully independent, there are instances when the central bank, often with the blessing and cooperation of the finance ministry (Treasury Department, in the US) intervenes in international currency markets to correct a perceived prolonged disequilibrium in exchange rate values. Sometimes this takes the form of a multilateral effort involving the central banks and finance ministries of other G7 countries.⁸⁵ But more often, the G7 countries fail to reach unanimity on the problem or the best solution to an exchange rate imbalance, leaving the option of policy intervention in the hands of a single country or subset of countries.⁸⁶

If a currency is deemed overvalued, as the US\$ was in 1984–85, then the US and other cooperating countries will sell dollars and buy other key currencies⁸⁷ in the currency markets to push down the

⁸⁵ The G7 nations include the US, Canada, Japan, Germany, France, Great Britain, and Italy. Russia is sometimes invited to join in economic policy discussions; hence the notation G8. The EU and European Central Bank (ECB) may be sending representatives to these meetings in the future as well

⁸⁶ "Japan, Germany and France vowed yesterday that they would intervene in foreign exchange markets 'as and when necessary in order to reduce volatility among the world's major currencies...a position that appeared to contrast with the view of US authorities that market forces should generally be left to determine appropriate levels for the dollar, euro and yen." Financial Times, January 16/17, 1999.

⁸⁷ *Key currencies* are those currencies most widely held in reserve by nations throughout the world. The G3 currencies of the past: \$, Yen, and DM, have since been replaced by the \$, Yen, and Euro.

relative value of the dollar. The pressure to do so in the mid 1980s originated in the US Treasury Department, in part because of export industry lobbying groups who were feeling the pinch. A strong dollar was hurting the overseas market share and profit margins of US exporters, and the growing trade deficit was of great concern to the White House, Congress, and the public. In fact, the pressure was so great that President Regan appointed a new Secretary of the Treasury, Jim Baker, who was especially concerned that the trade deficit and ongoing hardships of US exporters might stir pressure for increased protectionism in Congress.⁸⁸ His concern led him to initiate a shift in both the US position over exchange rates and on US fiscal policy. In September 1985, representatives from the G5 nations⁸⁹ met at the Plaza Hotel in New York City, and agreed to a multi-billion dollar intervention to push down the value of the dollar to a more realistic level. Simultaneously, the Treasury began to work with Congress to reduce the federal government deficit.

Why might such other countries as Germany and Japan be willing to participate in the intervention? Both Germany and Japan were benefiting from the strong dollar. Their exporters were increasing their market share in the US and in other overseas markets where they competed with US goods, and their bilateral trade balances with the US were in large surplus. But as a German representative explained years later, Germany was happy to have a trade surplus with the US, but not too much of a surplus. Like the US Treasury department, Germany was also concerned about protectionist pressures in the US Congress. Japan was concerned with growing criticism and increasing protectionist pressures.

The opposite scenario took place in 1995 when the US dollar plummeted to record lows vis-à-vis other key currencies. This was largely a repercussion of the Mexican peso crisis, but the downward trend of the dollar continued far beyond what forecasters expected, given the underlying economic fundamentals. At that time, pressure to intervene in foreign currency markets was brought on by the Japanese government, which was being lobbied by Japanese exporters. The US Treasury Department agreed that a prolonged under-valuation of the US dollar was not in the U.S. interest either, and it agreed to intervene, with the cooperation of the Federal Reserve, by buying US dollars with Japanese yen and German marks.

The upshot of all of this is that when currencies overshoot their long-run equilibrium level, trade policy professionals and industry lobbyists have a role to play in encouraging finance ministries and central banks to intervene accordingly. This is especially true if a currency is judged significantly overvalued, which can inflict much hardship on a country's exporters and contribute to a worsening trade deficit.

3. Relative Inflation Rates and Unemployment Rates

Changes in relative inflation rates also influence exchange rate movement. If, *ceteris paribus*, a country's inflation rate falls relative to the inflation rates of its major trading partners, then we can expect that country's currency to appreciate relative to the currencies of its major trading partners. Likewise, if a country's inflation rate increases relative to the inflation rates of its major trading partners, we can expect that country's currency to depreciate.

⁸⁸ Once again the extent of the parallel to events of December 2002 is worth exploring. Treasury Secretary Paul O'Neill resigned (allegedly under pressure), on December 6th. The dollar immediately fell, on the possibility that the new appointee (yet to be announced at press time) would substantially shift policies, resulting in a weaker dollar in response to the record current account deficit. O'Neill had, after all, repeatedly denied that the dollar was overvalued and refused international initiatives to intervene in foreign exchange markets. Our assessment is that the change was motivated primarily by the weak domestic economy, and does not signal a change in thinking about exchange rates and the current account deficit.

⁸⁹ The G5 nations include the US, Great Britain, Japan, France and Germany.

Changes in the unemployment rate work in a similar fashion. If, *ceteris paribus*, a country's unemployment rate falls, then we can expect that country's currency to appreciate, in large part due to the increased expectation of a future rise in interest rates. Likewise, if a country's unemployment rate increases, we can expect that country's currency to depreciate due to an increasing likelihood of a future cut in interest rates.

It follows that what may be good for a country's economy (lower inflation, and lower unemployment), is not necessarily good for exporters, as these developments may cause a country's currency to appreciate, and thereby render exports less price-competitive. However, it should be noted that if low inflation and/or low unemployment occur alongside rapid economic growth, then exporters may make up for their loss in overseas price-competitiveness by increasing domestic sales. Even if the domestic market share, or slice of the pie, is small, the overall size of the pie enlarges as domestic demand for all goods rises.

4. Relative Growth Rates and Productivity Figures

Most OECD countries release quarterly GDP figures and economic indicators of worker productivity. Currency markets typically respond to these figures the moment they are released, particularly if the official figures differ from earlier forecasts. If a country's growth rates and productivity gains both increase, then currency markets respond by buying more of that country's currency, causing it to appreciate, on the expectation that foreign investors will increase their investment in that market. Likewise, if the economic growth rate and productivity figures fall or fall below market expectations then the currency will depreciate. There is one exception, and that is when growth rates are high, but productivity levels remain stagnant. This was the case for the Euro-zone countries in 2000. Typically in such situations the increase in GDP is the result of increased consumer spending instead of real productivity gains. If consumers are spending more, they likely are spending more on imports also, which requires the sale of their country's currency and the purchase of foreign exchange, thus decreasing the value of their currency relative to other currencies.

As with inflation and unemployment, there is little a trade policy professional or commercial diplomat can do to influence growth rates or productivity gains, aside from being aware of how these economic indicators influence exchange rates, and hence export competitiveness.

5. Bilateral and Overall Trade Balances

In theory, chronic bilateral trade imbalances should also influence exchange rates. If a country is running chronic trade deficits with one of its largest trading partners, theory would suggest a depreciation of that country's currency vis-à-vis the currency of the large trading partner. But in practice, there is little evidence of this in recent years. In the second half of the 1990s, the US ran a chronic trade deficit with Japan, yet the US dollar steadily appreciated against the Japanese yen during that time.

Overall trade balances operate in a similar fashion. A large trade deficit would seem to indicate a greater demand for foreign exchange (and conversely an increased supply of domestic currency), resulting in a depreciation of a country's currency. And yet, as the US trade deficit hit new records in the year 2000, the US dollar continued to appreciate against many major currencies, particularly the Euro. Many other factors were influencing the value of the dollar in the opposite direction, such as the growth rate differential between Europe and the US. The principal reason was the inflow of capital (foreign investment) associated with high US productivity growth.

The balance of payments consists of two main parts: the current account (principally the trade balance) and the capital account (the balance of international trade in assets, such as stocks, bonds, loans, real estate, etc.). A large trade deficit puts pressure on a currency to devalue only if it is not financed by an equally large capital account surplus. Thus the US trade deficit today is sustainable

only to the extent that foreign investors increase their holdings of US stocks, government and corporate bonds, real estate, etc.

Just as trade imbalances influence exchange rates, exchange rates contribute to trade imbalances. The appreciation of the US dollar in the late 1990s undoubtedly contributed to a widening US trade deficit. Consumers were attracted to cheaper imports and foreign consumers were reluctant to purchase more expensive US exports. This latter relationship, of exchange rates influencing trade balances, is one of the key reasons why commercial diplomats and trade policy analysts need to be concerned about exchange rate behavior.

6. Expectations Driven by Political Campaigns and Elections

Political campaigns can be a volatile time for exchange rates. Currency markets respond to the expectation of significant political change because of what it might imply for future fiscal and monetary policy direction. For example, when George W. Bush moved ahead in pre-election polls in 2000, the Euro fell in response because of the expectation that a future Bush administration would be less likely than a Gore administration to support currency market interventions to prop up the Euro (i.e., to raise the Euro's value relative to the dollar). Bush's tax cut was also seen as expansionary fiscal policy that would cause an appreciation of the dollar. This phenomenon has been observed throughout the world. Currency traders follow popular polls closely and buy or sell currencies based on expectations of the fiscal and monetary policy positions of the leading candidate.

Another lesson to be gleaned is that the political campaign season is not a good time to lobby finance ministries for currency interventions or other policy actions which might influence exchange rates in another direction. Incumbent administrations have too many other priorities during the campaign season, such as the health of the domestic economy, to worry about external balance issues, controversial trade policy initiatives, and exchange rates.

**CHAPTER 9 UNDERSTANDING AND WORKING WITH DATA GENERATED FROM
ECONOMETRIC MODELS, INPUT-OUTPUT TABLES, CGE MODELS, AND
SENSITIVITY ANALYSES**

In this chapter, econometric models are introduced, along with a brief description of input-output tables, computable general equilibrium (CGE) models, and sensitivity analyses. These descriptions are not step-by-step guidelines on how to generate these models. Rather, the objective is to describe what these models do, and how to interpret results of these models when confronted with them.

Econometric Models

Econometrics, also known as regression analysis, serves two very different purposes: 1) to determine which factors influence the key variable of interest, called *dependent variable*, and of those factors, called *independent variables*, which are more influential than others (generally called structural models), and 2) to create a predictive tool or equation to help researchers approximate one unknown variable when information on the other variables is known (called forecasting models).

A dependent variable is a factor that can be explained by one or more factors. Those explanatory factors or variables are called independent variables.

Let us begin with the example of agricultural protection. We start with a research question, such as: What accounts for year-to-year changes in the level of agricultural protection in a country? Or we could ask: What accounts for the different levels of agricultural protection among different countries? First, we compile an initial list of potential factors and determine how we might measure each of these factors (or variables). These variables could include the following:

- agricultural sector as a proportion of GDP and labor force
- percentage of seats in the legislature from agricultural areas (where a significant proportion of the voting population is employed in the farm sector)
- political campaign contributions from the farm lobby
- agricultural exports as a proportion of total agricultural production⁹⁰
- exchange rates
- agricultural commodity price index

There may be many other factors worth considering, but let's work with these for now. We start with a hypothesis, that the level of agricultural protection is determined by the importance of agriculture in the economy, the composition of the legislature or lobby activities, the level of agricultural exports, exchange rates, commodity prices, and politics. Usually, statisticians state their null hypothesis, that there is no relationship between these variables and the level of agricultural protection. If the results of the regression analysis indicate that these variables are significant, then we say we are able to reject the *null hypothesis*.

⁹⁰ Behind each of these prospective variables is an interesting story about how they may work. With greater agricultural exports, would we expect a country to be more vulnerable to retaliation against its own exports when it protects? This sounds reasonable at first, until you consider that plantation agriculture for export and subsistence agriculture (or animal husbandry versus crop growing) may be in completely different geographical areas, political constituencies, and may even be competing for resources, such as water, land, labor, etc., so that proponents of one may be happy to see the other harmed. The US is a classic example of simultaneously promoting (subsidizing) some agricultural exports while restricting many agricultural imports (orange juice, sugar, peanuts, etc.)

The null hypothesis states that there is no relationship between the dependent and independent variables, and it is usually written in such a way that the analyst expects to reject it.

Once we have a set of potential variables, we can test whether and how these variables influence agricultural protectionism by using regression analysis. There are two categories of regression analysis to choose from: time-series and cross-sectional. If we wish to do a time-series regression analysis, we would need to collect data on all of the variables listed above on a yearly, monthly or quarterly basis. We could take one country, and for each year collect data for all the variables listed above. When we run the data through a statistical package with regression capabilities, we may get something like this:

Level of Agricultural Protection = 6.83 + .25 (agric. as % of GDP) + 0.767 (campaign money from the farm lobby) – 0.23 (agricultural exports) + 0.049 (exchange rates) – 2.33 (agricultural prices) + error.

What this equation says is that agricultural protection is a function of the importance of agriculture in the economy, contributions from the farm lobby, agricultural exports, exchange rates, and farm prices. The numbers, known as coefficients, once corrected for different units of measure (see below), tell us the relative importance of each factor. The equation itself is a useful predictive tool. For instance, if campaign money from the farm lobby is one of the most important variables for the level of agricultural protection year to year, that is very important information for a trade policy decision-maker who hopes to liberalize trade in that sector. One could, perhaps, predict the impact of campaign finance reforms on such contributions, and thus, indirectly, on protection.

The equation also tells us how each of these variables influences the level of protection. Numbers with negative signs before them (% of GDP, and exports) indicate variables with an inverse relationship to agricultural protection. (As agricultural prices fall, agricultural protection rises. As agricultural prices rise, agricultural protection falls.) The first number in the equation is called the constant, indicating that it is not associated with any particular variable. Literally, the constant tells you what value the dependent variable (agricultural protection) would take if all the independent variables were equal to zero. If a country had no agricultural sector at all, we would expect protection to be zero, so, on theoretical grounds, there should be no constant in this regression model at all, and none of the independent variables would have significant regression coefficients. In practice, one often must make compromises between theoretical correctness and fit (how well the regression model fits the data), particularly if you plan to use the model in forecasting.

When we use time series regressions to predict the impact of future actions or events, we are making several assumptions. First, we are assuming that the coefficients are constant over time. Suppose our data covers the period of time from 1980 to 2000. A major campaign finance reform is passed in 1996, providing matching government funds for major candidates, making them less reliant on campaign contributions. The estimated coefficient on campaign contributions will be a weighted average of the before (high) and after (low) actual coefficient, and will be unsuitable for forecasting. Thus, be wary of time series regressions that cover long time periods, particularly for economies that are growing rapidly and undergoing structural change. Economists will try to demonstrate that their data is “stationary” and their coefficients stable through the time period in question.

A second source of potential problems arises from the very nature of time-series analysis. Time-series analysis belongs to a family of procedures called single variable models. In these models, estimated (or forecasted) values of the variable of interest are a function of past values of the same variable, and therefore, do not take into account the effects of other factors. More rigorously, it is assumed that whatever factors may have affected the behavior of the variable in the past will continue to do so in the future. Under these circumstances, more recent values may prove more influential on future values than older observations. This problem can be mitigated by introducing

specific parameters in the estimation equation that, to an extent, regulate the influence of more recent observations.

Another approach is a cross-sectional regression analysis. In a cross-sectional regression analysis, measurements are taken at one point in time, across a group of similar individuals, firms, countries, etc. Instead of assessing one country's level of protection over time, we might look at the world's 50 richest countries, and measure the same variables described above. This type of model is also known as a multivariable model. One difficulty with this approach is that some data may be difficult to obtain, such as political campaign contributions. But for a cross-country comparison, a more appropriate variable might be the proportion of seats in the legislature from agricultural areas. Most econometricians will take note of this issue before they select variables and decide what type of regression analysis to use. One must often use "proxy" variables, variables that are not precisely what you want, but are closely related to what you think is important.⁹¹

$$\mu = \varepsilon\rho + \beta v + c$$

It looks like Greek because it is Greek. But somewhere in the text of the article from which it came, each of these symbols is defined. In this example, μ = the percentage change in imports, ε = price elasticity of demand for imports, ρ = percentage change in the import price, β = income elasticity of demand for imports, v =percentage change in income, and c = a constant (explained below). In prose, the above equation would read: "The percentage change in imports is equal to the price elasticity of demand for imports multiplied by the percentage change in the import price, plus the income elasticity of demand multiplied by the percentage change in income, plus a constant number."⁹² Or put a better way, "Imports are a function of the import price and income. The price elasticity of import demand determines the extent to which import prices influence the level of imports. And the income elasticity of demand determines the extent to which changes in income influence the level of imports."

In this example the percentage change in imports is our dependent variable, i.e., the variable influenced by all the other variables. The dependent variable always appears on the left-hand side of the equation. The other critical variables in the equation (percentage change in exchange rate and percentage change in income), are known as independent variables. The independent variables always appear on the right hand side of the equation. Price elasticity of demand and income elasticity of demand are not independent variables because they do not vary. Rather, they are constant numbers in our equation, what economists call parameters to be estimated.

Ideally, there is very little relationship among the independent variables themselves. The only important relationship is between the independent variables collectively and their effect on the dependent variable. And the direction of causality is always clear: the independent variables influence the dependent variable, and not the other way around.

How do we know that such a causal relationship exists? Previous theoretical work and empirical research is our guide. Empirical research simply refers to the collection and use of real data, which is then used to test theories and to formulate equations like the one above. In this example, the

⁹¹ For instance, suppose you want to measure the level of education of a country's labor force. It is difficult to find information on years of schooling in many countries, and even more difficult to compare the *quality* of education in the US, Germany, South Korea and Brazil. Some researchers try to use proxies such as books, magazines, and newspapers sold per person. Japan appeared to be the best-educated country in the world, until it was pointed out that this measure included racing forms and other betting sheets, manga, and pornography.

⁹² When the equation is written in logarithmic format.

formulation of the equation allows us to derive the price elasticity and income elasticity of demand for imports. Indeed, this is how most of the elasticities mentioned in this handbook were derived.

For the sake of statistical significance, a regression equation should be based on at least 50 observations or cases.⁹³ In this example, we might take monthly data and record the % change in imports, the % change in the exchange rate, and % change in GDP for a fifty month period of time. Most statistical packages will take this information and produce an equation which best accommodates or “fits” the real data. Hypothetically, the result might look like this:

$$\mu = -1.31\rho + .25v + .139$$

where -1.31 is the price elasticity of demand; 0.25 is the income elasticity of demand; and 0.139 is a numerical constant, in this case an exogenous trend rate of import growth— 0.14% —abstracting from changes in prices and income.

The numbers in front of the two independent variables are known as coefficients. Only in this example do the coefficients represent elasticities of demand. Normally, the coefficients are simply numbers, with no additional significance apart from their role in the equation. The raw or “unstandardized” coefficients tell us very little, except perhaps the nature of the relationship (positive or negative). These coefficients must be “standardized” to correct for different units of measurement (billions of dollars vs. barrels of oil, for example). Only when this correction is made, is it possible to say which independent variable (income or exchange rate) is most important in influencing the dependent variable.

Typically, but not always, the numbers included in a published article or report are the “unstandardized” coefficients, though the relative weight of the standardized coefficients is often mentioned in the text. Also, econometricians may only write out an equation like the one above if the variables included are statistically significant. But frequently they post in a table all of their regression results, including the statistically insignificant results, to illustrate which relationships appear to be significant and which do not (an important result, as well).

Several problems do exist with cross sectional regressions. By treating each country’s data as one observation in your regression, you are treating each country as if it were exactly alike, except for the values of the variables. A careful econometrician will test whether coefficients are the same for groups of countries in the sample, before running the final regressions across all countries. This can be done with dummy variables, which take a value of 1 if the country is a member of a particular group and zero if not. But note that by doing this you are sub-dividing your sample, and each group now needs to be about 50 observations, cases, or countries.

For example, cross-sectional regressions that attempt to explain economic growth based on investment, education, and other variables indicate that even if Latin American and African countries could increase investment and education to match Asia, they would still not grow as rapidly. The difference might be related to culture, openness to trade, institutions, or location, but represents some important difference between groups of countries that cannot be explained by the econometric model. This is a danger sign that some important variable has been excluded from the model.

Now let’s consider a real example from the literature. The following equation suggests that Indonesian exports are a function of lending rates, wage rates, exchange rates, and oil price shocks.

⁹³ Some of the things we assume when running regressions are true only if the sample is large. But when is “large” enough? Not surprisingly, it depends on the complexity of the estimation equation and other factors, but 50 is a good rule of thumb to be safe, while 40 to 50 would be the “gray area.”

$$\text{NOXR} = -8.59 + 25.46 \text{ RLR} - 9.81 \text{ RWR} + 34.13 \text{ RER} - 15.71 \text{ DOIL}$$

$$(-.25) \quad (0.97) \quad (-0.43) \quad (4.75)^{***} \quad (-3.84)^{***}$$

R² = 0.85, F statistic = 19.1, D.W. = 2.09⁹⁴

NOXR = real (corrected for inflation) value of non-oil exports in \$billion

RLR = real lending rate

RWR = real wage rate

RER = real exchange rate

DOIL = did oil price rise sharply during the year (yes = 1, no = 0)

This is a time-series regression that attempts to measure the impact of four independent variables on NOXR (real non-oil exports) for Indonesia during the period 1974–1990. The number preceding each variable is the coefficient for that variable, in other words, the projected change in the dependent (or left-hand side) variable when the independent variable increases by one unit. There is also a number (–8.59) by itself, with no variable name. This is the constant of the regression, indicating the value the dependent variable would take if all independent variables were equal to zero.

We interpret the final term of the equation as meaning that, *ceteris paribus*, non-oil exports from Indonesia were \$15.7 billion lower in years of oil price booms (1974, 1979, 1980) than they were on average, in years without oil price booms. The second to last term indicates that depreciation of the real exchange rate (more Indonesia Rupiah per US dollar) accompanies rising non-oil exports. The third to last term indicates that rising real wages accompany a fall in real non-oil exports. And finally, the second term indicates that rises in the real lending rate accompany rising real non-oil exports.

Moving to the second line of numbers, in parentheses under the coefficient estimates, we see numbers ranging from –3.84 to 4.75. These are the T-statistics of the individual coefficient estimates, indicating how many standard deviations away from 0 the estimated coefficient is. The standard deviation tells us how closely our observations are to what we might expect if there is no discernible relationship at all between the independent and dependent variable. More simply, the larger the number of standard deviations we are from the null hypothesis, the more statistically significant are our results. Ideally, we would like our T statistic to be >2 or < –2. Any number between 2 and –2 is probably not significant at the 95% confidence level (the standard by which statisticians judge statistical significance).

Think of the T-statistic as a built-in skeptic that must be convinced. When you convince that skeptic, you get to put stars (***) on your T-statistics. The skeptic starts by doubting that the two variables are related at all. Thus the starting point, or null hypothesis, is that the estimated coefficient is zero. If the T-statistic is –3.84, the estimated coefficient of –15.71 is 3.84 standard deviations away from 0, and thus it is highly unlikely that we could have gotten this estimate if there actually was no relation between the two variables. Another way of looking at it is to say that the true value of the coefficient you are trying to estimate is 95% likely to be between –7.5 and –24, which is –15.7 plus or minus two times the standard error of the coefficient, which is 15.7/3.84 = 4.1.

⁹⁴ McCleery, Robert and William James, “Beyond Export-led Growth: Alternative Pathways to a ‘Neutral’ Trade Regime,” East-West Center mimeo presented at the East Asian Economics Association meeting in Seoul, August 1992, p.31.

Similarly, it is nearly certain that real non-oil exports are positively related to the real exchange rate, since the estimated coefficient is 4.75 standard deviations away from zero. We say these two coefficients are statistically significant, and the number of stars generally shows how certain we are that the coefficient is not 0. Three stars, as we see here, means that there is less than a one percent chance that the variables are not related, two stars would mean less than 5 percent, and one star would mean less than 10 percent. We generally disregard the sign for the purpose of assigning statistical significance, since we care how many standard deviations, not in which direction.

What does it mean when a coefficient is not statistically significant? We generally do not know. There exists a complex calculation to determine the probability that you have accepted the null hypothesis when it is false (called a power test), but it is almost never done. An analogy: rejecting the null hypothesis is like observing a smoking gun and concluding that a shot has been fired, but not rejecting the null hypothesis is like not observing a smoking gun. Without additional information, we have no idea whether or not a shot has been fired. Be skeptical of anyone who says that accepting the null hypothesis is evidence of anything.

The third and final line contains summary statistics, applying to the regression as a whole. The first one, called “R-squared,” indicates what fraction of the total variation in the dependent variable is explained by the independent variables, as a group. Here the answer is 0.85, or 85 percent, which is fairly good. Be skeptical of the ability of a regression equation to predict future values of the dependent variable based on predictions of the value of the independent variables if the R-squared is much below 0.65. But you should also be skeptical of an R-squared of 0.99 or higher. The author may be “estimating” an accounting identity, or other inappropriate equations.

The fact that a numerical association exists does imply in anyway that there is a causal relationship between variables. Causality analysis is a different technique altogether and requires careful examination of other elements not addressed here.

The second summary statistic is the F-statistic. It is similar to the T-statistic, except that it measures the likelihood that none of the independent variables is related to the dependent variable. Even if no individual variable is statistically significant, collectively they may be. In this case, the F-statistic is high (19), and the combination of independent variables clearly is related to the dependent variable.

The final summary statistic here is the Durbin-Watson statistic, which tests for autocorrelation. Autocorrelation is when error terms for each observation in the data set are correlated. It can take on values between 0 and 4, but should ideally be close to 2. Typically, authors will use standard adjustments to their data to make the D.W. statistic come out near 2, but if for any reason you see results reported with a D.W. statistic over 2.7 or under 1.3, you should be suspicious.

Input-Output Tables

Within the general interdependence analysis, the input-output (I-O) approach is no doubt the most prominent. Its strength is based on its detailed presentation of the nature of the interrelationships among industries and among these industries and other economic sectors. In other words, it represents the basic fabric of an inter-industry system as it exists not only within each country but also among countries.

The power derived from I-O models generality is also the source of its major weaknesses. The limitations of the I-O model are the consideration of fixed coefficients (factor proportions), the absence of economies of scale or agglomeration, and the lack of optimizing behavior by industries. These departures from reality have spurred the development of other methods as complements, or as separate tools altogether.

Input-output tables are often used to assess the impact of a change in the final demand of a given sector on all sectors of the economy. The technique for this purpose is attributed to Vassily Leontief and is known as the Leontief model. The basic idea of the model is quite simple. The amount of sector i 's output required for the production of sector j 's output X_{ij} is assumed to be proportional to sector j 's output X_j .

There are many instances when we need to know the direct and indirect effects of a trade policy measure on other sectors in the economy. The rule of thumb is that the indirect impacts of a change in employment or production are roughly twice the direct effect. But there are times when you would like to know these indirect impacts more precisely, both in magnitude and in what other sectors will be affected. Input-output analysis is ideal for those times.

An input-output table consists of rows and columns showing the respective outputs and inputs of each industry measured in relevant units, and how those outputs are distributed. The following hypothetical input-output table is used to illustrate a small, closed economy with five sectors: energy, transportation, steel, consumer goods, and financial services.

		OUTPUT					
		Energy/ Electricity	Transport	Steel	Finance	Final Demand	Total Output
	Energy	100	900	2000	300	700	4000 kwh
	Transport	400	500	100	100	1900	3000 vehicles
INPUTS	Steel	1000	2000	3000	100	900	7000 tons
	Finance	3000	500	3000	500	1000	8000 services
	Labor	3000	1000	1000	1000	0	7000 worker years

In this example, we must view the last column to see total output for the entire economy. Reading across the rows, we see how that final output is distributed across industries. The economy produces 4000 kilowatt hours of energy. How is this energy distributed across sectors? The energy/electricity sector uses 100 kwh (it takes electricity to make electricity), the transportation sector uses 900 kwh, the steel industry uses 2000 kwh, the financial sector uses 300 kwh, and another 700 kwh is used by private consumers. Reading down each column, we see how many inputs each industry needs to produce its output. To produce 7000 tons of steel requires 2000 kwh of electricity, 100 vehicles, 3000 tons of steel, 3000 financial services, and 1000 worker-days.

Recall that the value of total output in a sector can be divided into the value of inputs and value added. Value added can be thought of as the additional value created in the production process, such as the value of steel, over and above the value of the iron ore, energy, etc. used to make the steel. If we sell a silk suit for \$200 and the cost of the silk and thread is \$50, then the value added is the difference, or \$150 ($\$200 - \$50 = \150). Another way of thinking about value added is the pool of money an owner has left for wages, overhead costs, and profits after selling her output and paying for all other inputs.

To take another numerical example, let's think about a sawmill. The owner of the sawmill uses logs and electricity as inputs to make boards, combining these inputs with labor and capital. If he needs \$3 of log and \$1 of electricity to make \$10 of boards, we say that the value added in the board-making process is $\$10 - (\$3 + \$1) = \6 . If annual board output is \$10 million (five million board feet

times \$2 per foot), then the owner has \$6 million of value added with which to pay workers, pay rental or mortgage on the mill, and pocket as profits.

Suppose anti-dumping duties are imposed on Canadian board production, which raises prices and output for US producers like the one we are studying. Suppose the supply elasticity in the industry is 1, and a doubling of the price to \$4 per board foot induces producers to double output as well, to 10 million board feet. In this example, only two other industries are affected; there is an increase in the demand for inputs by sawmills amounting to \$3 million of additional logs and \$1 million of additional electricity. But both log and electricity production use inputs from other sectors, perhaps gasoline for logging and oil and coal for electricity. Gas, coal and oil use inputs from other sectors, and so forth, ad infinitum. Input-output tables can be manipulated to give the total derived demand from all other sectors of the economy that will arise from a change in production in one sector, analogous to the way we can calculate the multiplier effect in principles of economics.

Input-output tables also contain information on labor inputs. That data can be used to estimate the direct and indirect impact of a trade measure on employment (See Chapter 5).

Interpretation and Extension.

The crucial assumption in I-O analysis is that sectoral production is completely demand-driven. This assumes excess production capacity in all sectors, and that increasing demand can always be met by higher output with no price increase. Since this assumption is likely unrealistic, I-O models are more useful as guidelines to potential induced linkage effects, and as indicators of likely supply bottlenecks that may occur in a growing economy, than as predictive models (i.e., supply is infinitely elastic). It is important to note that I-O models are more appropriate for marginal changes, since large changes can produce unforeseeable effects which can result in significant industrial restructuring.

The underlying production function assumes constant returns to scale and no substitution among different inputs. To the extent that prices remain constant, this is acceptable, as substitution among factors is expected to be induced by relative price movements. But when prices are not constant, this constitutes a severe limitation of fixed (that is, predetermined) price models.

Variants of the basic framework are easily introduced in I-O models:

- a) Intermediate inputs can be disaggregated into domestic and imported to represent more closely multiplier effects in the local economy.
- b) When the I-O model is used to examine the effect of small changes in the final demand vector, a matrix of marginal rather than average coefficients can be used.
- c) Alternative models of price formation can be used, provided they do not depend on the level of supply and demand.

CGE Models

Computable general equilibrium (CGE) models are complex tools used by economists more frequently in recent years. They have been featured in many policy debates, which purportedly use basic economic principles to predict the impact of policy changes on such crucial economic variables as wages, prices, total and sectoral gross domestic product (GDP), trade flows and balances, etc. When properly constructed, CGE models are extremely useful tools. However, they have clear limitations, and are of course subject to the garbage-in, garbage-out critique.

CGE models have two main parts. The first is an input-output matrix, showing how production in one sector leads to demands for output from other sectors. For instance, in a simple model, one might see that \$100 worth of corn production requires \$10 worth of corn production (for seed), \$15

of chemical production (fertilizer and pesticides), \$10 of financial services (loans), \$15 of machinery and equipment (tractors and harvesters), etc. These proportions are assumed to be fixed; the amounts assumed to be required for production, regardless of prices.

The second part of the model has producers choosing how much of what products to produce and what combination of capital and labor to use, based on output prices and input prices (e.g., wage rate and cost of capital). How production responds to changes in prices is governed by elasticities built into the model. Thus getting good estimates of these elasticities is crucial to the ability of researchers to generate realistic results. These elasticity estimates are so critical that one should be wary of any modelers who do not share information about the sources and assumptions regarding elasticities and/or fail to use sensitivity analysis (see discussion below) to show how different assumptions change the results.

Another crucial point for CGE models is the date of the base year. Particularly for developing countries undergoing rapid growth and/or structural change, it is important to have recent data that closely reflect the current state of the economy. Static CGE models do not simulate how an economy will respond to a policy-induced shock, but instead show how the economy of the base year would have been different, had the policy change taken place several years earlier. Dynamic models, which take into account changes over time, are very rare and difficult to construct. They attempt to take into account likely changes in such economic variables as labor force and capital stock, based on internal and external factors over a transition period.⁹⁵ However, it is nearly certain that some of the assumptions about the future will be incorrect (imagine trying to predict oil prices over the last three years, for instance). Thus, modelers present results as deviations from a “baseline,” that will almost certainly be incorrect. The hope, then, is that errors in predicting key variables will affect both the baseline and alternative policy scenarios equally, leaving the difference between the projected outcomes roughly unchanged.

Sensitivity Analyses

Sensitivity analyses test the robustness of these economic models and their conclusions by varying some of the key assumptions and seeing how the conclusions change under different assumptions. Indeed, any detailed study projecting impacts into the future should have a sensitivity analysis appended to it. Beware any studies that don't.

Sensitivity analyses are particularly important when models contain assumptions that are in dispute. Elasticities, for example, are often in dispute as they may change over time. Data to determine elasticities accurately may not be available, leading to wide-ranging estimates. Discount rates are also hotly disputed among economists. Other troublesome assumptions such as the probability of an external supply shock are worth testing with a sensitivity analysis.

Let's assume a highly respected study has projected a net benefit of \$5 billion to the US auto industry over the next 10 years if China adopts the required trade liberalization measures for admittance into the WTO. On what assumptions is this conclusion based? What was the price elasticity of demand assumption for Chinese consumers? The authors of the study had to make an educated guess. Let's say they chose a price elasticity of demand = 1. A sensitivity analysis would then run their calculations over again, but with price elasticity of demand = .70, for example, and again with price elasticity of demand = 1.30, for example. So now we have a range of results.

⁹⁵ For example, we might consider demographic patterns and immigration to determine the future labor force, and savings and investment behavior, plus external factors of lending and foreign investment, to determine future capital stock.

Price Elasticity of Demand	Benefit to the U.S. Auto Industry
0.70	\$2.5 billion
1	\$5 billion
1.30	\$7.2 billion

Now we can say that based upon what the study's authors consider the most reasonable assumptions, the net benefit to the US auto industry of Chinese trade liberalization is approximately \$5 billion, although it could be as little as \$2.5 billion and as much as \$7.2 billion.

From a policy-making and/or lobbying standpoint, a wide range of results is not always helpful. Decision makers like to have one "ball-park" figure, calculated from the most reasonable set of assumptions. And typically many sources of uncertainty exist in economic forecasts. Thus a full list of possible outcomes would be more confusing than helpful. The confusion can be minimized by selecting one or two key variables on which to perform a sensitivity analysis. One economist's "reasonable assumption" might be extremely unreasonable to others, and failure to perform sensitivity analyses on all parameters is not a sin. It is therefore the responsibility of the trade policy analyst to examine every detailed study carefully, looking at the range of results and evaluating the choice of estimates for the most critical assumptions in the model. Even if there is agreement on the most reasonable assumption, the debate may not stop there. Some politicians or union leader may feel that avoiding losses is more important than maximizing economic gains. Thus, even if it is agreed that gains are likely, if losses are possible, some groups may object to the policy proposal.

The choice of which variables to run sensitivity analyses on and what values to choose is a personal one. While expressing skepticism regarding the usefulness of a sensitivity analysis as it is currently performed, Gary Hufbauer of the Institute of International Economics offers a rule of thumb for selecting the values: halve and double your most likely value, to create a high and a low estimate.⁹⁶ If the results seem significant for policymakers in both "best" and "worst" cases, the argument for or against the proposed policy measure is stronger.

There is no weakness in acknowledging that the world has many sources of uncertainty, and the best possible predictions will seldom be exactly right. The only danger is in presenting an impression to policymakers that anything could happen. If your research, with its sensitivity analyses, indicates that many possible good and bad outcomes alike may occur, the likely response of the policymaker is to do nothing, to avoid spending political capital on a policy that may not produce the desired results.

⁹⁶ Views expressed in private correspondence, summer 2002, in the form of a review of this manuscript.

CHAPTER 10 EFFECTIVE DATA PRESENTATION

When asked for good examples of effective data presentation, a senior US trade policy official replied, “Actually, some good examples can be drawn from the Ross Perot NAFTA ‘informercials.’ The effectiveness of his presentation made his points harder for us to refute, despite the lack of merit to most of his arguments.” While the authors of this text by no means intend to teach readers how to mislead their audience, knowing how to present data effectively and how to interpret graphs effectively are vital skills for policy analysts, legislators, and industry lobbyists. In this chapter we briefly describe some of the different types of graphs that policy makers can use to lend weight to a policy position. In the subsequent sections, the appropriate use of each type of graphical illustration will be explained, followed by a summary flow chart, indicating what factors to consider before selecting a particular type of graph. Guidance on effective presentation and interpretation of presented data is offered throughout.

The Five-Second Rule

We have all experienced, as readers, instances of ineffective data presentation: when we must stare at a diagram for an inordinate amount of time to decipher what the illustrator is trying to demonstrate. Sometimes the graph is drawn incorrectly. Other times too much information is squeezed into one diagram, or what looked clear in color is indecipherable in shades of gray. In general a good rule to follow is to design a graph that can be read easily within five seconds. If your audience cannot interpret what the diagram is trying to illustrate within five seconds or less, then the diagram is not effective. Occasionally there are times when a graph is more complex out of necessity. In these rare instances it is okay to violate the 5-second rule provided that the accompanying explanatory text is completely clear. For public presentations, however, the five-second rule should be adhered to.

Working with Time Series Data

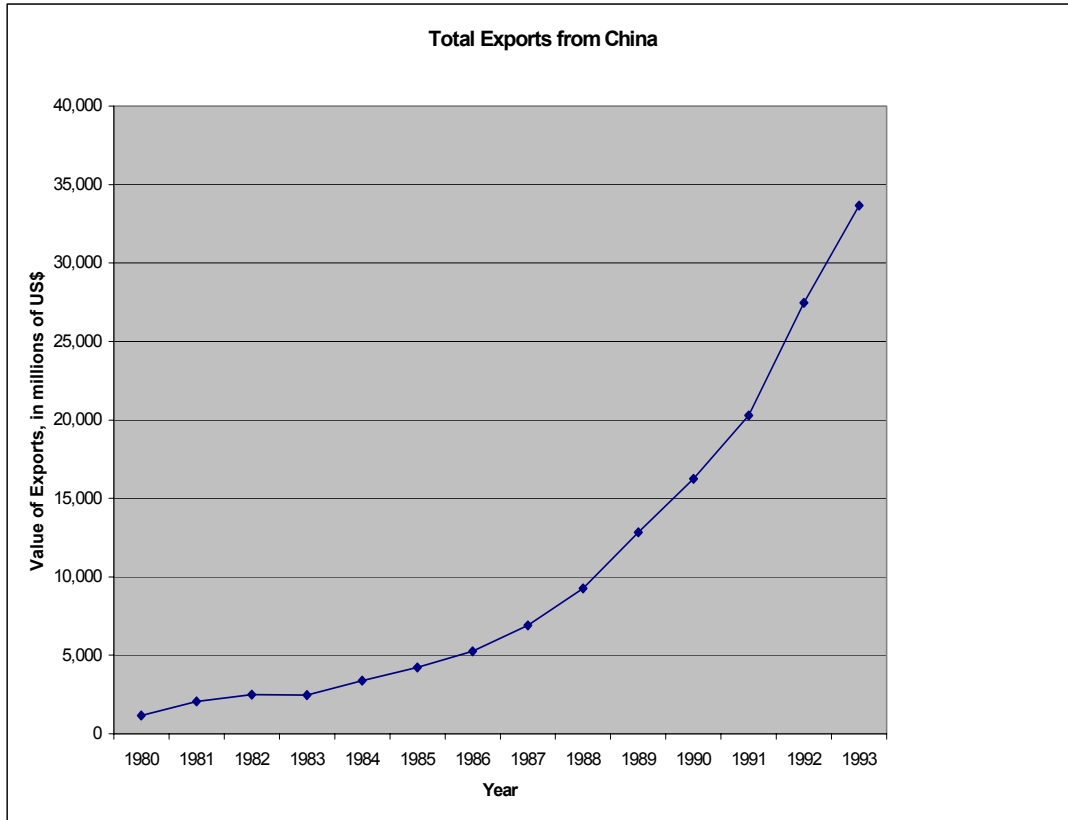
Time-series data is simply data measured over time, for example, the dollar-yen exchange rate over a ten year period. This type of data is best depicted with a line graph, although there are exceptions which will be discussed later. But since a line graph is most appropriate in 90% of these cases, a simple rule-of-thumb is “With time, use a line.”

Simple Line Graphs

All line graphs should read from left to right, with the oldest unit of time (earliest year, month or week) at the far left of the diagram, and the most recent year to the far right. This is important to keep in mind when creating spreadsheets of data, which are used for creating graphs. It is typical (but by no means a rigid rule) to have the time variable in the first column, and the variable being measured in the second column, with the earliest time period at the top of the spreadsheet, and the most recent time period at the bottom of the spreadsheet.

Consider the example of Chinese exports to the US over time. The two variables we are viewing are China’s exports to the US (which may alternatively be measured as US imports from China), and time. The horizontal or X-axis is counting years, from a starting year to an ending year, as you move to the right. The vertical or Y-axis counts Chinese exports to the US (in appropriate units, here in millions of dollar of value). Each point represents both a dollar amount and the year in which that trade occurred.

Figure 10–1 Line Graph / Exports from China



There are always tricks and traps to look out for when viewing graphs, particular time series graphs. For example, how did the illustrator choose the beginning and ending years in the series? For some series, it is possible to show either an upward or downward trend by a strategic choice of end points. For instance, consider the following series of US inflation rates.

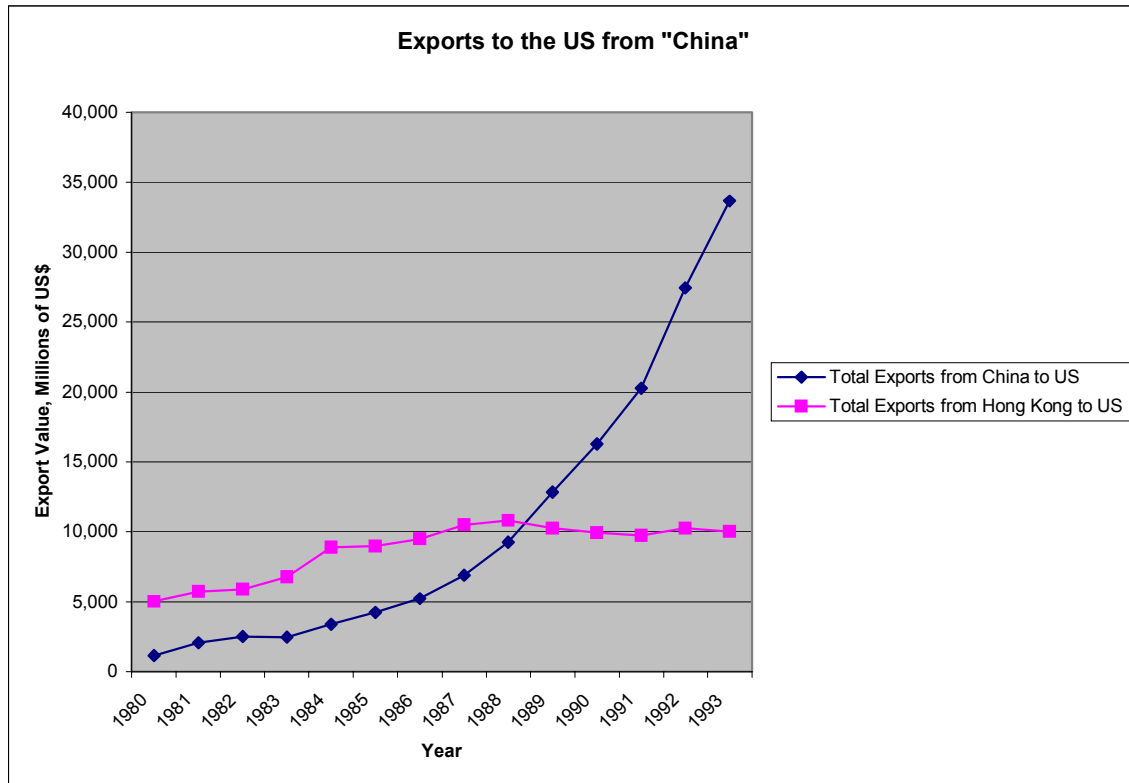
1982	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94
6.7	3.2	4.3	3.6	1.9	3.6	4.1	4.8	5.4	4.2	3.0	3.0	2.9

Multiple Line Graphs

It is very easy, particularly with line graphs, to show a second, third, or even fourth variable in the same illustration, as long as the additional variables are measured in the same units. (But even this limitation can be relaxed.) Returning to our export diagram above, we could add Hong Kong's exports to the US as a second line in our graph. The reason for doing so might be an assumption, based on other evidence, that a lot of Chinese products are shipped first to Hong Kong, then refined, packaged, or just transshipped and more effectively marketed to US consumers. Generally, multiple

line graphs should be limited to no more than four lines, even when the lines show up in different colors (as opposed to different shades of gray or different patterns of dashes, which are much more difficult to see). More than four lines is too much information, and the audience will not be able to appreciate the main point the presenter is trying to make.

Figure 10–2 Multiple Line Graph / Exports from China



Manipulating Scales

Not all vertical or y-axis scales begin at zero, nor should they. Suppose we are interested in looking at changes over time in the Japanese yen/US dollar exchange rate. Most foreign currency analysts (and trade policy analysts) are interested in depreciations and appreciations smaller than 5%. Yet such small changes would be difficult to observe if the vertical scale went from zero to 130. For the second half of the 1990s the line would almost look straight. So we must alter the range of the y-axis to “stretch” the graph and magnify movements in this exchange rate. We do this by choosing a y-axis range similar to the actual range of the data. If the exchange rate varied during the time in question from 105 yen to 125 yen/\$, then an appropriate range for the y-axis scale would be 100 to 130 yen/\$.

Another common, and completely acceptable, manipulation of y-axis scales is inversion. Inverting the vertical scale is extremely common with exchange rate diagrams. It is widely understood that an exchange rate diagram should illustrate appreciation of a currency with an upward sloping line, and

depreciation of a currency over time with a downward sloping line. But if the Japanese yen is moving from 105 yen to 125 yen per US\$, then the Yen is depreciating. Instead of inverting the exchange rate and having \$/Yen in place of Yen/\$ on the vertical axis (0.00813\$/Yen is less easily recognized than 123Yen/\$) we should invert the y-axis scale, so the bottom of the vertical sale starts with 150Y/\$, and the top of the scale ends with 80Yen/\$. If we were trying to illustrate the movement of the US dollar over time, then we would not need to invert the vertical scale.

Figure 10-3 Depreciating US Dollar

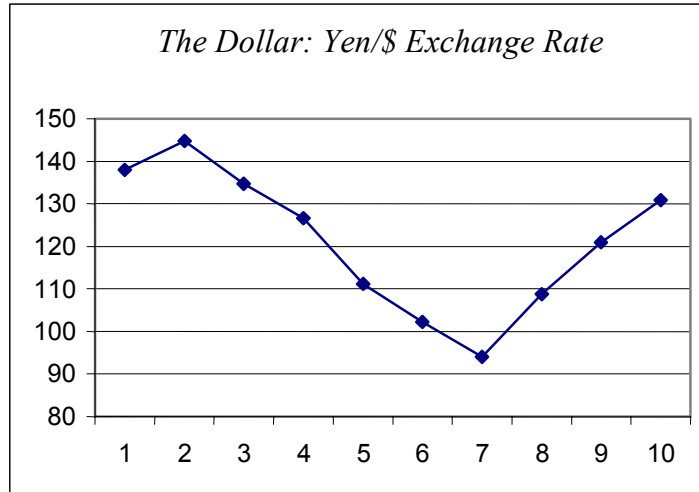
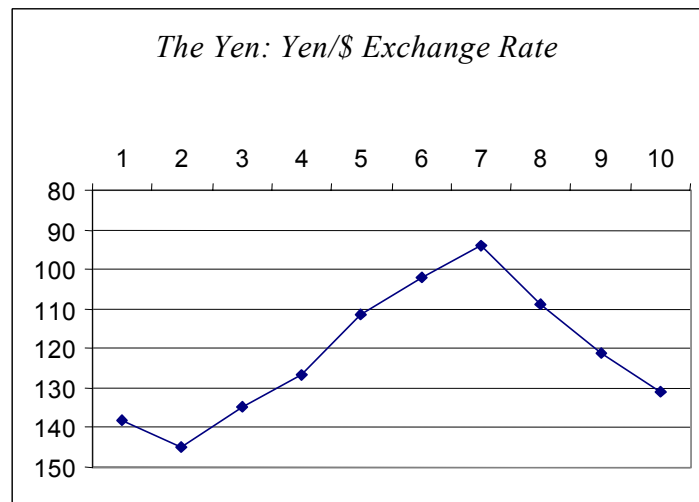


Figure 10-4 Appreciating Yen / Inverted Y-axis



Pie Charts

Line graphs are easy to interpret and can be extremely effective tools for illustration, but they are also limiting. The line graph of Chinese exports to the US, above, does not tell us what kinds of products China is exporting to the US. Did the increase in export sales represent an increase in all of China's exports to the US, or was it largely an increase in one or two categories of exports such as textiles and toys?

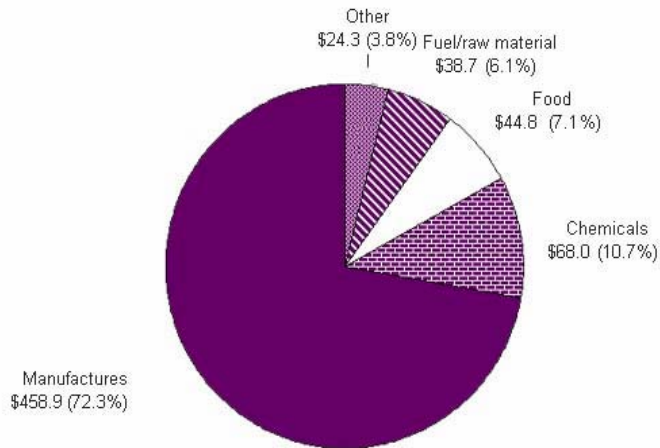
Generally, the best tool for showing the relative size of the component parts of a total is the pie chart. But this can only be done with one variable. For instance, if we wish to see the composition of Chinese exports to the US, we can only graph exports for one year. We would use only one column of data: a variable called exports by category. If we wish to show how this composition has changed over time, we would need to create a pie chart for each year in the time series, or the first and last years. The downside is that each pie chart would likely be the same size. It is theoretically possible to make the pie charts successively larger as the total amount of exports increases, but this is generally not done. Absolute dollar amounts could be indicated on each slice, but an audience is unlikely to compare and contrast the dollar amounts among 10 different pies. So pie charts are generally only good for graphing one variable, one point in time, to illustrate the respective proportions of the component categories. These component categories should ideally not exceed seven nor be smaller than three.

In the following example, we have only five categories of traded goods. The shadings of each respective pie are sufficiently different from one another to be easily distinguished in a black and white publication. Note that both the absolute figures (in billions of dollars) and the percentages (in parentheses) appear next to each pie slice.

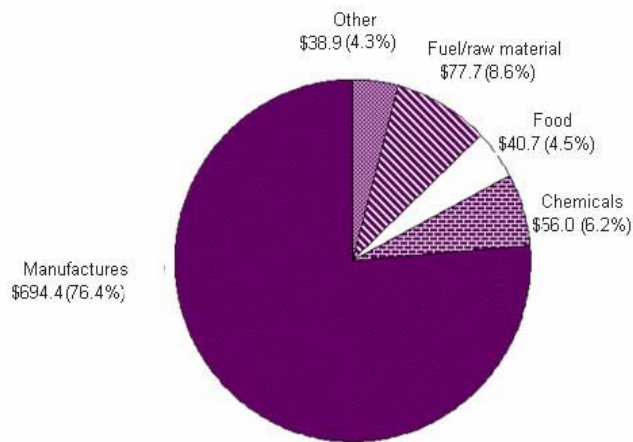
Figure 10-5 Pie Charts / US Imports and Exports

Exhibit 16
U.S. merchandise trade with the world, by product sectors, 1998

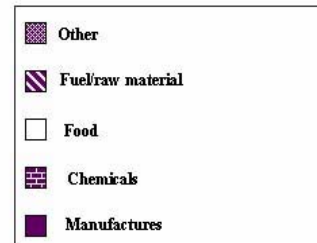
(Billion dollars)



U.S. Exports



U.S. Imports



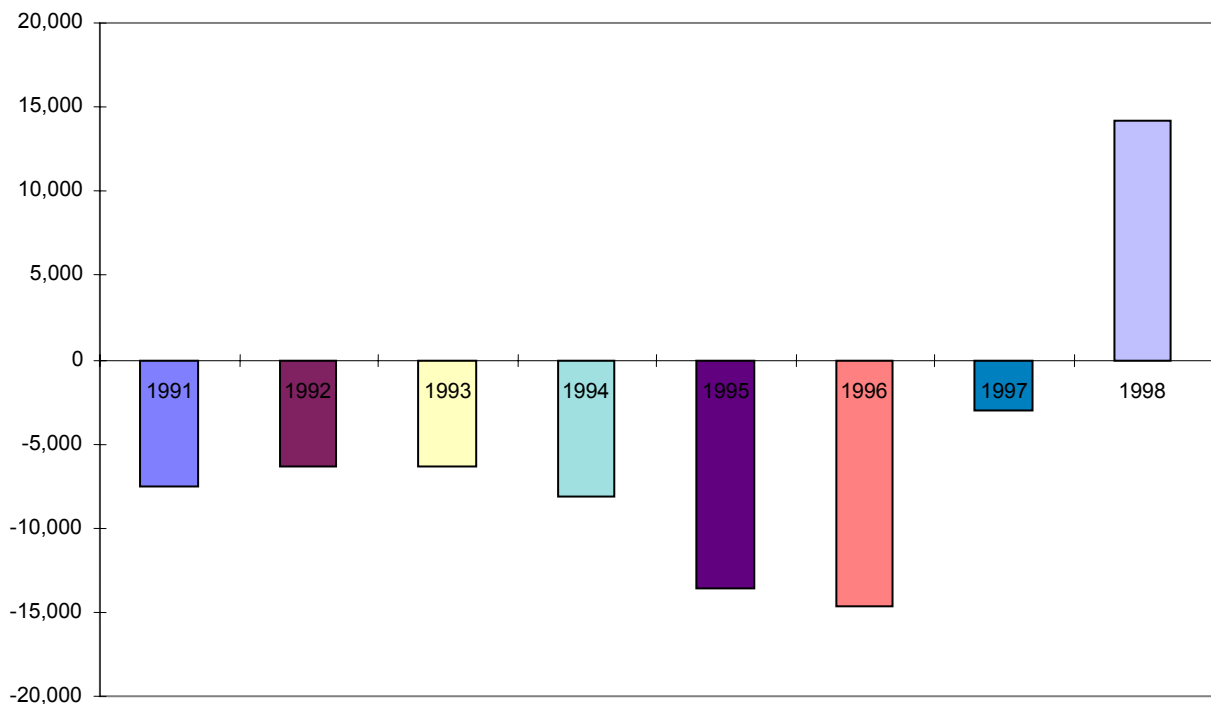
Note: Because of rounding figures may not add up to the totals shown. Exports are domestic exports, f.a.s. Imports are not imports for consumption, customs value.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Vertical bar charts

As discussed earlier, there are exceptions to the rule of using line graphs for time series data. If the data is summary data, such as end-of-year trade balances, then a bar chart is perfectly appropriate, and probably more effective. Whether one is looking at current account balances, or merchandise trade balances, or annual change in foreign reserves over time, the most appropriate illustration is a vertical bar chart, with years on the horizontal axis and the balance in financial terms on the y-axis.

Figure 10–6 Vertical Bar Chart / Thailand’s Current Account Balance

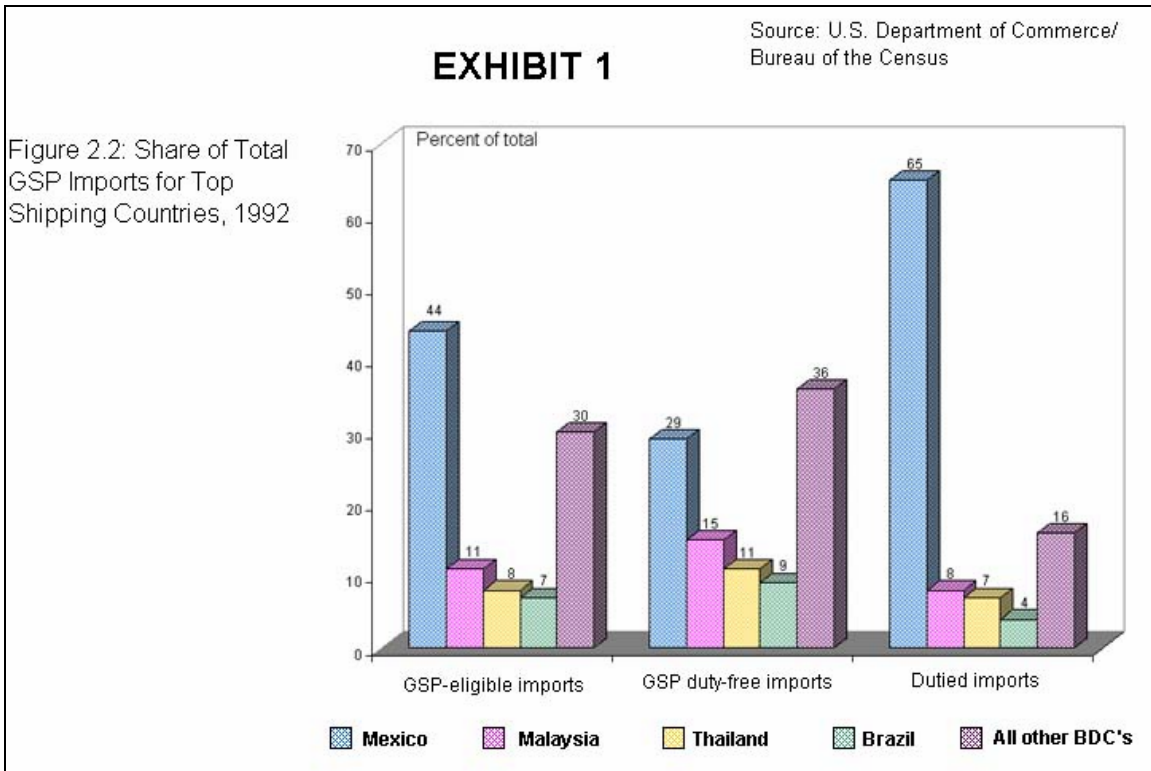


In general, bar charts are most commonly used when time is not one of the variables. Typically, there is one continuous variable (measured on the vertical axis), and one discrete variable (discrete categories, such as countries, type of trade barrier, etc.) on the horizontal axis. For example, if we wanted to show which four countries filed the most complaints with the World Trade Organization in the past five years, we would illustrate this with four vertical bars, each bar representing one of the four countries. The height of each bar would indicate the number of cases filed during this five-year period.

There are several variations on vertical bar charts, such as clustered bar charts and stacked bar charts. These charts are used where there is one continuous variable, and two discrete variables. In the example below of a clustered bar chart, the continuous variable is “percent of total,” and the two discrete variables are “country” and “type of import”. This is a fairly clear diagram, but because of

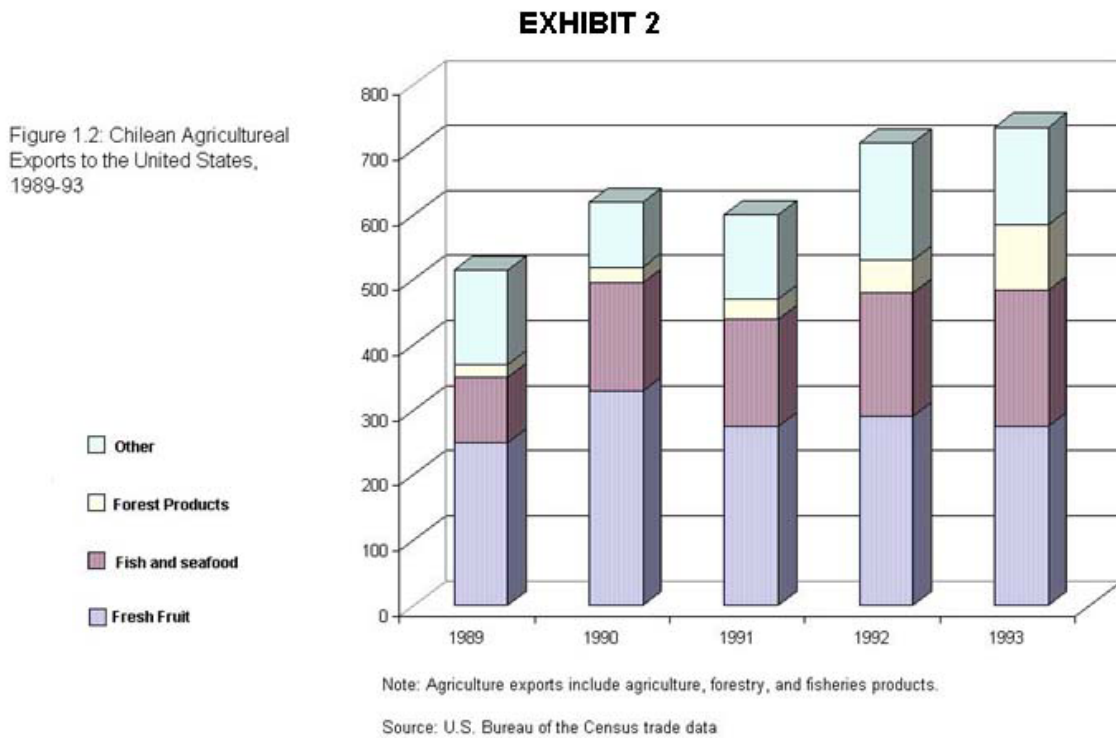
the amount of information in it, it probably would not pass the five-second test. At first glance, it would appear that Mexico accounts for a disproportionately large share of GSP (Generalized System of Preferences) imports to the US. But upon closer inspection, the share of GSP imports is much smaller than Mexico's share of dutied imports into the US.

Figure 10-7 Clustered Vertical Bar Chart / Share of GSP Imports



A stacked bar chart is also used when there is one continuous variable and two discrete variables. In the example below, the continuous variable is "US dollar value of imports," and the two discrete variables are "type of agricultural product," and "year." Generally, when "year" is one of the two discrete variables, the bars represent the years and the stacks represent the other discrete variable. Another guideline is to limit the number of stacks. Two to four stacks is ideal. More than six stacks is often indecipherable.

Figure 10–8 Stacked Bar Chart / Chilean Agricultural Exports



It is important to keep in mind when creating graphs that illustrations that look beautiful in full color on the computer screen may not look as wonderful when printed in black and white. There should be as much contrast as possible between the shadings of stacks and clustered bars to limit confusion and misinterpretation. Figure 10–9 is an illustration of a stacked chart, where this rule was not followed. Upon close inspection it is easy to interpret, but this graph does not pass the five-second rule, and could be improved by either compressing the smaller categories into three categories (e.g., foreign investment earnings, services, and merchandise trade), or shading the stacks differently:

- as shown
- with clusters representing countries and bars representing type of import
- with five bars, each representing countries, and stacks in each bar representing type of import
- with three bars, each representing type of import, and stacks in each bar representing each country

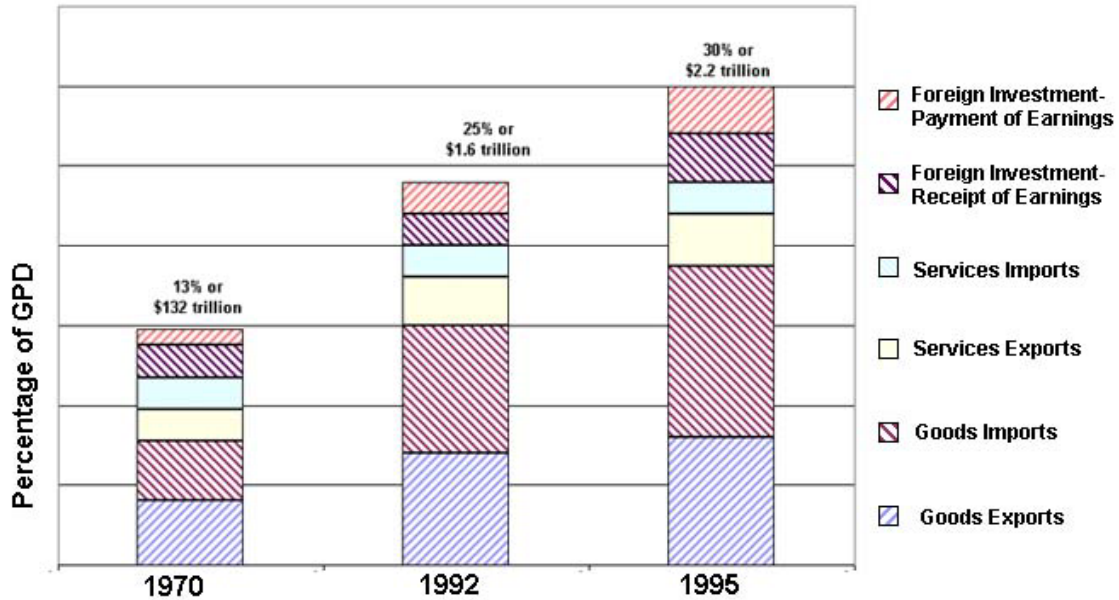
Each of these different presentations puts a slightly different spin or emphasis on the diagram.

Figure 10-9 Stacked Chart / Trade as Percentage of GDP

EXHIBIT 13

Growing Importance of Trade to the U.S. Economy

Total exports plus total imports as a percentage of value of U.S. GDP



Horizontal bar graphs

There are times when vertical bars are inappropriate, such as when there are too many bars (when the discrete variable has more than six categories) to illustrate vertically. In this case a horizontal bar chart is more appropriate. But horizontal bar charts are not recommended if one of the variables is “time”. It is counterintuitive for the audience to read consecutive time series data up and down rather than left to right.

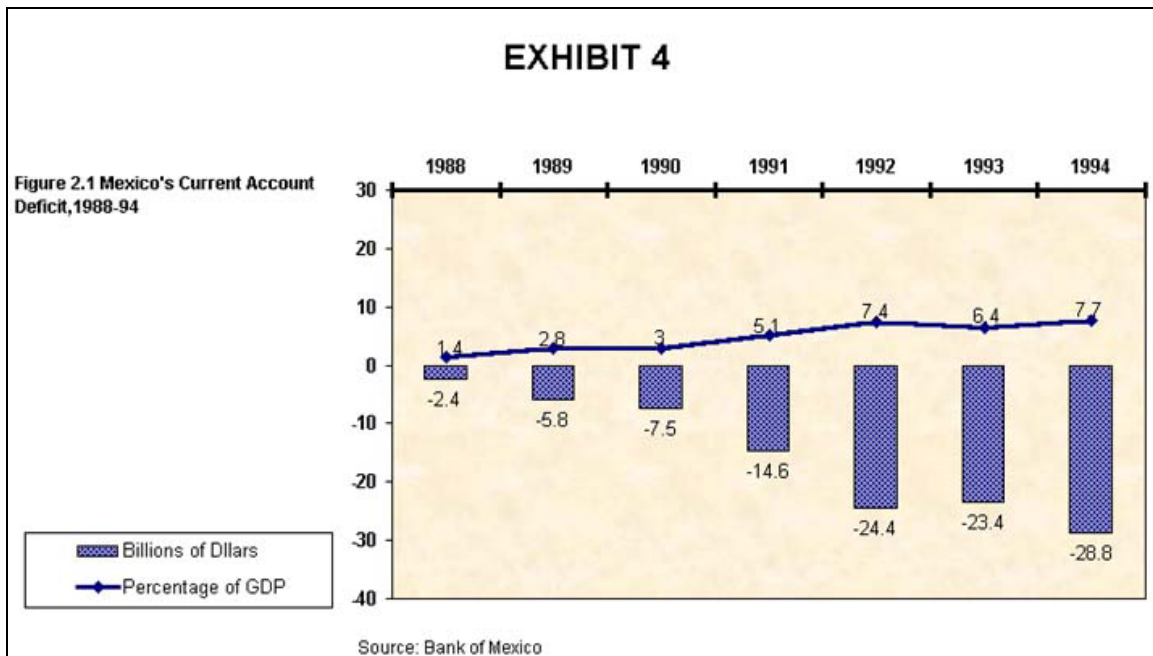
Horizontal bar charts are also not recommended for clustered charts, unless each cluster contains only two bars. In such a case, “time” is acceptable as a variable if one of the bars in the cluster is “year 1” and the other bar is “year 2”. In this case, the clusters illustrate how each individual case has changed from “year 1” to “year 2”.

Horizontal bar charts are useful for percentage changes over time, with negative changes illustrated by bars stretching to the left of the center line, and positive changes illustrated by bars stretching to the right of the center line.

Combining Lines and Bars

Combining both lines and bars can be very effective at times. In Figure 10–10 we see Mexico’s current account balance leading up to the 1994 Peso Crisis. In absolute terms, it is growing significantly over time, as evidenced by the hanging bars. But Mexico’s economy was also growing during this period. So a more important question would be, how significant are these deficits, measured as a proportion of Mexico’s GDP? Both pieces of information are illustrated on the same diagram. By coincidence, the illustrator was able to use the same left-hand vertical scale to measure both \$billions and %GDP. If the illustrator had wanted to use a separate scale for %GDP, then this scale could be drawn on the far right side of the diagram.

Figure 10–10 Combined Line and Bar Chart / Mexico’s Current Account Deficit



There are instances when superimposing a line and bar works well to illustrate causality. For example, what if we wanted to illustrate the impact of exchange rates on the trade balance? We could have bars illustrating the trade balance over time, and a line illustrating the country’s trade-weighted exchange rate superimposed on top of the bars. The vertical scale (the exchange rate) in this instance should be adjusted for optimal visual correlation.

Area diagrams

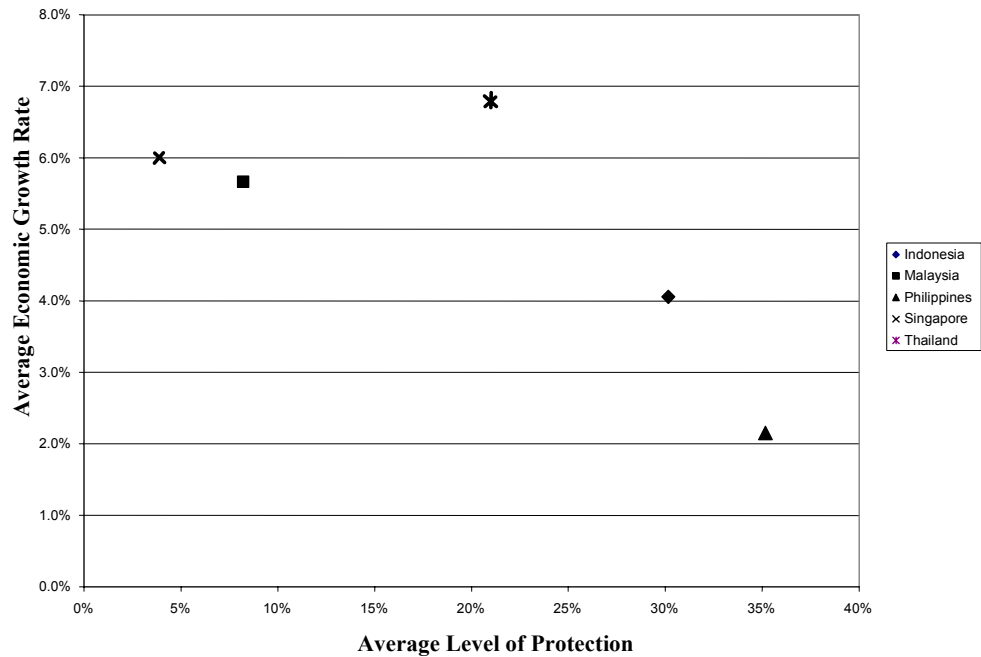
Area diagrams are seldom used because their utility is limited. There are instances, however, when they are visually effective. The most common use of area diagrams is with time series data divided into different component parts. In this instance, one of the variables would be a unit of “time,” a second continuous variable would be measured on the vertical axis, and a third discrete variable would be represented by the different areas in the diagram. For example, let’s say we wish to illustrate how the US Commerce Department’s budget has changed over time, both in magnitude and composition. The total \$ would be measured on the vertical axis (either in real or nominal terms). And each area would represent a discrete category of the budget. This is particularly effective if one wishes to illustrate how one budget category grows much faster than the others.

Scatter Diagrams

A scatter diagram is used when there are two continuous variables, neither of which is time, and one additional discrete variable. Three variables are the most that can be easily portrayed in a two-dimensional graph. If our discrete variable were “country” or “region,” we could use a scatter diagram to show combinations of the other two variables for each country or region. For instance, suppose we want to show the relationship between trade barriers and economic growth for Southeast Asian countries. We could put a measure of protectionism like average tariff equivalent on the x-axis, growth rate or per capita growth rate of real output on the y-axis, and label each observed combination of tariff equivalent and growth rate with the name or a code for the corresponding country. Our scatter diagram would look like Figure 10–11.

Figure 10–11 Scatter Diagram / Protection and Growth, Southeast Asia

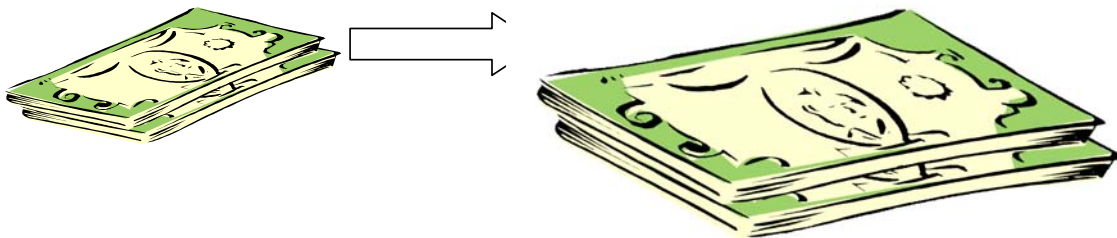
The Relationship between Protection and Growth, Southeast Asia, 1985-98



Using objects

Most statistical software packages do not allow for fancy graphics, but other kinds of software can be used to create beautiful diagrams which illustrate a point more effectively. For example, in a cost-effectiveness study one could illustrate the cost of each option with stacked dollar bills. Or, if the objective is to illustrate how a minor investment in say, Export-Import Bank loans yields a high rate of return, one could depict this with piles or bags of money.

Figure 10–12 Example of Object Manipulation



Combining text with graphs

Another effective way to illustrate a point is with text highlighting key dates in a time-series line graph. For example, if we were looking at a trade-weighted exchange rate of the US dollar over the past 20 years, we could insert dotted, vertical lines into the picture with accompanying text boxes indicating major currency interventions such as the Plaza Accord, the Louvre Accord, and the bilateral action of the US Federal Reserve and the Bank of Japan in August 1995. Other crises such as the Mexican peso crisis are also worth noting, as this crisis and the subsequent bail-out loans were a principal element in the rapid depreciation of the dollar in early 1995.

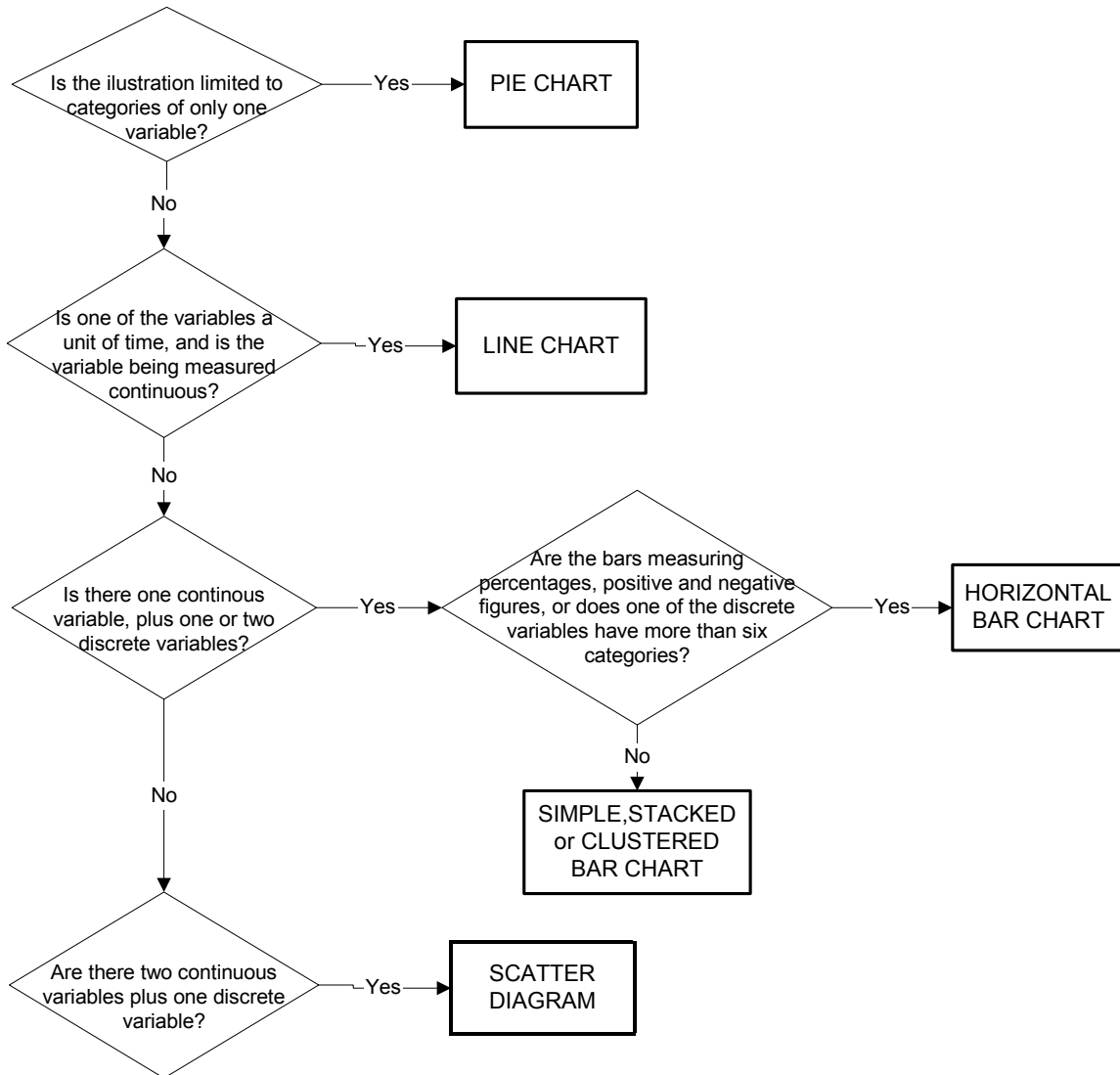
Appropriate use of 3-D

The use of 3-dimensional diagrams is becoming more frequent, largely because many illustrators and presenters think it makes their diagrams more polished. Unfortunately, the addition of 3-D can distract the audience from the main points of the presentation. Also, 3-D can distort images. For instance, using 3-D with a pie chart can give the mistaken impression that the pie slices coming out of the page are larger than they really are. This is particularly true if there are many pie slices, and the smaller slices are in the background. The only time 3-D is appropriate is when one wishes to graph three different variables with three different axes. For example, instead of a stacked bar chart, one might wish to show an index of protectionism for five different countries in four different time periods. A 3-D diagram would result in 20 different bars pointing out of the page, four rows with five country bars in each row. One caveat to creating such a diagram is that it sometimes requires ordering the dataset carefully so smaller bars are not obscured by much larger ones.

Summary

In summary, before deciding what kind of chart to use for the data at hand, clarify first how many variables there are. Are they continuous or discrete variables? Is a unit of “time” one of the variables? And what is the main objective of the diagram? These questions must be answered before the most effective type of chart can be selected. The following flow chart summarizes most of the choices discussed above.

Figure 10-13 Choosing the Appropriate Data Presentation



Types of data

The three types of data you will use most are trade policy data, macroeconomic data, and microeconomic data. Key issues to consider in choosing data sources are consistency, level of aggregation, timeliness, reliability, and the screening or selection process for data in a source.

Data on a country's trade barriers and policies can be extremely hard to find. The primary sources are GATT/WTO country studies. The advantages of these studies are their similar methodology across countries and the detail and extensive coverage. Disadvantages include their irregular publication (a country may be covered once every 3–5 years, thus the data you want may be 4–6 years old), their pro-trade and trade liberalization bias, and that they have been slow to include quantitative measures of the protectionist impact of non-tariff barriers (NTBs), much less “domestic” laws and policies relating to government procurement, customs procedures, harmonization of standards, etc. The USTR publishes an annual trade review, covering trade barriers and “unfair” trading practices in key US trading partners. They have been leaders in attempting to quantify the impact of NTBs, but the country coverage is limited, and the countries and products selected for attention reflects the specific US commercial and political agenda of the time, rather than a comprehensive list of a country's trade barriers. The text of published trade agreements, and executive summaries and new articles can be helpful, but be wary of generalizing from specifics or making specific claims based on generalizations. For instance, the initial ASEAN trade deal covered 40 percent of all “tariff lines,” but barely 10 percent of regional trade, since most countries concentrated tariff cuts for partner countries on products not actually produced by their regional partners.

Macroeconomic data is usually easier to find, but still problematic. Definitions, methodologies, and oversight may be different in different countries. Exchange rate variations can make dollar-denominated data do odd things from year to year. Some data sources, such as the Penn world tables, attempt to convert domestic currency figures to dollars at a hypothetical equilibrium exchange rate (usually based on purchasing power parity) rather than the current market exchange rate. International data sources such as the UN, IMF, WB, etc. have pros and cons. The main advantage is that data collection methods, sectoral definitions, etc. are presumably the same in all countries, with the international organization providing oversight and possibly technical assistance. The problems include the time lag before such data is published and the limited detail and fairly high degree of aggregation, making it less suitable for current policy debates. Examples include: 1) UN yearbooks of national account statistics, industrial production, trade, etc.; 2) UN agencies such as ILO, FAO, etc. which follow international employment, agricultural production and trade, and other specialized issues; 3) such International Monetary Fund data publications as International Financial Statistics Yearbook, Government Statistics Yearbook, Direction of Trade Statistics, etc.

National data, in the home country language, are an important source. The ability to read the language, particularly for laws and legal changes, is critical. For bilateral, as opposed to multilateral, trade deals and disputes, the improved timeliness of national data should make it your primary source. You will need to investigate how the statistical services of the particular country are divided among government agencies, but ministries of trade, industry or commerce, finance, and census are good places to start. For the US, the Bureau of Economic Analysis (under the US Department of Commerce) is a good one-stop shopping place (see the monthly Survey of Current Business and the annual National Income and Product Accounts, for example). The Bureau of Labor Statistics

Monthly Labor Review should be your primary source for national employment trends. Detailed surveys of manufacturing and service industries are published every 3–4 years. The Census Bureau also publishes data at the level of states, counties, and standard metropolitan statistical areas (SMSAs).

Academic studies can be great sources of data and analysis. But you must remember that the data has been collected, organized and analyzed from a particular perspective to answer a specific question. If your perspective or purpose differs, the data and analysis may not be useful. Additionally, the process of searching can be tedious and time consuming. The title of a paper may or may not serve as a guide to the data it contains, or even reflect if data is used at all. Become familiar with the types of papers different journals publish, and don't bother with those that are purely theoretical.

As we all know, any internet search today yields thousands of “hits.” NGOs, think-tanks, industry organizations, and private individuals place their ideas, numbers, and analysis in the public domain for you. When you use these sources you must try to judge their reliability and identify their “editorial bias.” The Economic Policy Institute and the American Enterprise Institute will not agree on either the numbers or the implications of a trade policy initiative. Quoting such a source, or using it without attribution, will link you to that group in the eyes of the reader.

Final thought: Ask yourself what is the best available data. Ask yourself how much variation there is on a particular estimate. What do you think is the appropriate middle ground?

INTERNATIONAL

IMF

<http://www.imf.org/>

The site contains easy hyperlinks to databases that contain very comprehensive financial, macroeconomic, market, general country and other information of the member states falling minimum into the following categories:

- (1) International Capital Markets
- (2) Country Reports
- (3) Country Policy Intentions Documents
- (4) [IMF Survey](http://www.imf.org/external/pubs/ft/survey/surveyx.htm) (<http://www.imf.org/external/pubs/ft/survey/surveyx.htm>) issued every two weeks
- (5) [Finance & Development](http://www.imf.org/external/pubs/ft/fandd/2002/06/index.htm) (<http://www.imf.org/external/pubs/ft/fandd/2002/06/index.htm>) issued quarterly
- (6) [IMF Staff Papers](http://www.imf.org/external/pubs/ft/staffp/2002/02/index.htm) (<http://www.imf.org/external/pubs/ft/staffp/2002/02/index.htm>) a research journal of the IMF
- (7) [IMF Research Bulletin](http://www.imf.org/external/pubs/ft/irb/archive.htm) (<http://www.imf.org/external/pubs/ft/irb/archive.htm>) issued quarterly
- (8) Working Papers
- (9) Policy Discussion Papers
- (10) Periodicals
- (11) Research at the IMF. As a standard setting agency IMF also provides the standards covering a number of economic and financial areas, including data dissemination, fiscal, monetary and financial policy transparency, banking regulation and supervision, securities and insurance regulation, accounting, auditing, bankruptcy and corporate governance.

Inter-American Development Bank (IADB)

www.iadb.org

Data contained are mostly for Latin America.

Internet Securities, Inc.

<http://www.securities.com/>

Internet Securities, Inc., established in 1994, is a provider of electronically delivered emerging markets business information. The company has offices in 18 countries and is headquartered in New York City.

ISI Emerging Markets delivers current news, hard-to-get company's and industry information, financial markets data or macroeconomic analysis direct from more than 35 emerging markets and from over 4400 publications in Asia, Latin America and Central and Eastern Europe.

Subscribe to get the most valuable information for free for 1 week.

Macroeconomics

CIA World Factbook

<http://www.odci.gov/cia/publications/factbook/index.html>

Contains macroeconomic information on almost all countries of the world.

OECD

www.oecd.org/std/index.htm

Data contained are mostly for OECD countries.

World Bank

<http://www.worldbank.org/data/countrydata/countrydata.html>

Contains macroeconomic information on almost all countries of the world. A feature allows you to compare specific types of data for various countries simultaneously.

NORTH AMERICA

CANADA

Canadian International Trade Tribunal

www.citt.gc.ca

Contains documents on trade policy issues taken to the tribunal. Includes appeals, dumping, procurement, safeguards and textiles.

Department of Foreign Affairs and International Trade

www.dfait-maeci.gc.ca/tna-nac/menu-e.asp

Contains Canadian trade policies on products, services, export-import controls, and other important ones. Also has information of social aspects, and dispute settlement cases related to trade.

Infoexport

www.infoexport.gc.ca

(requires free registration)

Market reports by sector and by country; however, sectoral reports are accessible only for Canadian citizens.

Statistics Canada

<http://www.statcan.ca>

www.statcan.ca/english/tradedata

Search data on all commodities by their codes.

Trade & Economic Analysis

<http://www.dfait-maeci.gc.ca/eet/menu-e.asp>

Reports on Canada's ongoing macroeconomic developments; data on foreign trade with various countries on a monthly, quarterly and annual basis.

UNITED STATES

An Overseas Private Investment Corporation (OPIC)

<http://www.opic.gov/>

OPIC is an agency of the US Government. Its mission is "to mobilize and facilitate the participation of United States private capital and skills in the economic and social development of less developed countries and areas, and countries in transition from no market to market economies. In pursuing its overall goal OPIC provides a number of useful for investors' information falling into the following sections: (1) Country Links Database Information for each selected country; (2) OPIC' publications; (3) OPIC & Small Business; (4) OPIC & the Environment."

Bureau of Economic Analysis (BEA)

www.bea.doc.gov

Much macroeconomic information (GDP, trade volume by sector, etc.) for the US states, US as a whole and foreign markets. Includes Input-Output accounts, capital flow, transportation, capital markets.

Bureau of Labor Statistics

<http://bls.gov/mxp/>

Contains US import and export price indexes (includes an e-mail subscription program) both current and historical.

Business Information Service for Newly Independent States

<http://www.bisnis.doc.gov/bisnis/bisnis.cfm>

BISNIS keeps US companies informed about commercial developments in the NIS, operating like a market research group and preparing on the regularly basis the most comprehensive reports and analysis which include:

- (1) Current Market Assessments and Data on a range of industries and NIS countries/regions
- (2) Export and Partner leads
- (3) Updates on Commercial Laws and Regulations
- (4) Guidance on sources of Finance for NIS trade and investment
- (5) Tips on [Transportation](http://www.bisnis.doc.gov/bisnis/isa/isa-transp.cfm) (<http://www.bisnis.doc.gov/bisnis/isa/isa-transp.cfm>), [Banking](http://www.bisnis.doc.gov/bisnis/isa/isa-banking.cfm) (<http://www.bisnis.doc.gov/bisnis/isa/isa-banking.cfm>), [Customs](http://www.bisnis.doc.gov/bisnis/customs.cfm) (<http://www.bisnis.doc.gov/bisnis/customs.cfm>), and [other practical business issues](http://www.bisnis.doc.gov/BISNIS/bulletin.cfm) (<http://www.bisnis.doc.gov/BISNIS/bulletin.cfm>)
- (6) Notice of upcoming conferences and trade promotion events
- (7) New resources, including websites and business support organizations
- (8) Information on U.S. Government, multilateral, and other programs supporting U.S commercial relations with this part of the world.

Economic Report of the President

<http://w3.access.gpo.gov/eop/>

Export Portal – US Department Of Commerce

www.export.gov

Contains: export statistics; list (with links) of trade statistics institutions worldwide; sector outlook and trends (including import-export, production volume); Trade Policy Information Systems (restricted access); Foreign trade data; and tariff and tax information resources.

Federal Reserve Bank

<http://www.federalreserve.gov/>

Standard International Trade Classification

<http://dataweb.usitc.gov/scripts/sicsitc.asp>

List of codes of the Standard Trade Classification, and Standard International Trade Classification.

Trade Policy

Customs – Import & Export Regulations

<http://www.customs.ustreas.gov/impoexpo/impoexpo.htm>

Contains much information on U.S. customs regulations, including export licenses, shippers export declaration, [Automated Export System \(AES\)](#), duty rates, quotas, and international agreements.

US Dep't. Of Transportation

National Transportation Data Archive

www.bts.gov/ntda

US International Trade Commission

<http://dataweb.usitc.gov/>

Contains Tariff Database; US imports and exports by your list of products or one at a time; plans for tariff reductions; and trade data with regions or country.

<http://www.usitc.gov/>

<http://www.ita.doc.gov/>

LATIN AMERICA

Latin American Statistics

<http://www.lanic.utexas.edu/>

Contains trade, economic and other data for Latin American countries.

Latin Investor

www.latininvestor.com/economy

Macroeconomic information on all Latin American countries.

ARGENTINA

Central Bank (Banco Central de la Republica Argentina)

<http://www.bcra.gov.ar/>

INDEC (equivalent to the Bureau of the Census)

<http://www.indec.mecon.gov.ar/default.htm>

BRAZIL

Confederação Nacional de Industria (CNI)

<http://www.cni.org.br/english/f-ps.htm>

(Site in Portuguese and English)

Contains Brazilian macroeconomic information; trade policies (publications only available by purchase).

MÉXICO

Central Bank (Banco de México)

<http://www.banxico.org.mx/>

INEGI (equivalent to Bureau of the Census)

<http://dgcnesyp.inegi.gob.mx/bie.html-ssi>

EUROPE

The Economic Trends Series (ETS)

<http://www.economic-trends.org/>

The ETS is a Tacis financed project aiming at:

- (1) Obtaining, collating and interpreting economic statistics
- (2) Disseminating these economic statistics on a continuous, consistent and up to date basis through regular bulletins to international and local decision-makers
- (3) Training local counterparts. Achieving greater visibility for the contribution of Tacis to the reform process. The ET website is available in English and Russian and consists of six country sections: [Armenia](http://www.economic-trends.org/am/) (<http://www.economic-trends.org/am/>), [Azerbaijan](http://www.economic-trends.org/az/) (<http://www.economic-trends.org/az/>), [Georgia](http://www.economic-trends.org/ge/) (<http://www.economic-trends.org/ge/>), [Kazakhstan](http://www.economic-trends.org/kz/) (<http://www.economic-trends.org/kz/>), [Moldova](http://www.economic-trends.org/md/) (<http://www.economic-trends.org/md/>) and [Uzbekistan](http://www.economic-trends.org/uz/) (<http://www.economic-trends.org/uz/>).

Each of them offers: (1) Country data, including quick facts and a database of main economic indicators; (2) Archive of recent reports; (3) Contact information and country links.

The European Bank for Reconstruction and Development (EBRD)

<http://www.ebrd.com/english/pubs/index.htm>

This is an official site of EBRD. It contains: (1) EBRD Annual Report 1995 to 2000; (2) A comprehensive source of information on current business and investment in 27 countries of central and eastern Europe and the CIS; (3) All additions of EBRD published journals, LAW IN TRANSITION, IS AVAILABLE SINCE NOVEMBER 1998. It offers extensive coverage of legal developments in the region; (4) The working paper series has been produced to stimulate debate on the economic transformation of central and eastern Europe and the CIS; (5) Environments in transition is a biannual periodical published in English and Russian. It provides regular information on the Bank's environmental programs.

Eurostat

<http://www.europa.eu.int/comm/eurostat/>

(Available in English, German and French)

Statistical information on various aspects of the European Union, such as the economy, social conditions, employment, industry and trade, agriculture, the environment, technology and foreign trade. Contains monthly reports and various statistical products on trade, some only available through purchase. The “COMEXT” database has plenty of statistical packages available for purchase.

Macroeconomics

European Commission – Trade News

http://www.europa.eu.int/comm/trade/index_en.htm

(Available in English and French)

This EC site has news related to foreign trade of the European Union. It contains the EU’s trade policies and statistics. It also contains statistics organized by sector for goods and services; and information on the EU’s policies on different trade issues.

Tacis technical dissemination project (TDP)

<http://www.tacisinfo.ru/en/index.htm>

The role of the TDP is to ensure that the experience gained by the European Union Tacis program is retained, and has the opportunity to be used by others throughout the NIS and Mongolia. The site contains:

- (1) The wide range of analytical papers falling into the following industry categories: [Energy](http://www.tacisinfo.ru/en/elib/Energy_ru) (http://www.tacisinfo.ru/en/elib/Energy_ru), [Food and Agriculture](http://www.tacisinfo.ru/en/elib/Food and Agriculture_ru) (http://www.tacisinfo.ru/en/elib/Food and Agriculture_ru), Small and Medium-sized Enterprises, [Transport & Telecommunications](http://www.tacisinfo.ru/en/elib/tt_ru) (http://www.tacisinfo.ru/en/elib/tt_ru), Human Resources Development and [Others](http://www.tacisinfo.ru/en/elib/Others_ru) (http://www.tacisinfo.ru/en/elib/Others_ru)
- (2) Statistical Comparison: Russia and the EU Member States (1990-1996)
- (3) Hyperlinks to huge databases: State Committee of the Russian Federation on Statistics ([Interstate Statistical Committee of the CIS - http://www.cisstat.com/](http://www.cisstat.com/)) and the Statistical Office of the European Communities ([Eurostat - http://europa.eu.int/eurostat.html](http://europa.eu.int/eurostat.html))
- (4) A number of on-line brochures dedicated to particular projects, subjects or sectors
- (5) Case studies
- (6) Special reports on projects

UKRAINE

Derzhovnishinform

<http://www.ukrdzi.com/wwwengl/information.shtml>

Derzhovnishinform is Ukrainian experts in international trade. The statistics, analytics and other reference information on the given site are presented on the following categories:

Trade and economic missions of Ukraine abroad.

Regional Administration of Foreign Economic Relations and Trade.

Taxation system.

Customs.

Fiscal Analysis Office for the Verkhovna Rada

http://www.fao.kiev.ua/index_e.html

The site provides analytical macroeconomic/finance data falling into the following categories:

- (1) **Budget Reform** - http://www.fao.kiev.ua/corpBudcode_e.html (Monitoring of Ukrainian Press, Intergovernmental relations)
- (2) Analytical materials (Consolidated and State Budget, Intergovernmental relations, Public Debt, Tax Policy)
- (3) **Presentations** - http://www.fao.kiev.ua/corpPresent_e.html (Draft Budget 2002, Monitoring of the Implementation of the New Approach to Intergovernmental Transfer Allocation)
- (4) **Budget and Fiscal Review** - http://www.fao.kiev.ua/corpQut_e.html (Jan-Sep 2001; Jan-Jun 2001; Special Issue, June 2001)
- (5) Budget and Tax laws of Ukraine).

Trade Policy

State Customs Service of Ukraine

http://www.customs.gov.ua/eng/frame_e.html

The site represents useful and necessary information concerning the questions of the customs regulation of the foreign-trade activity, organization of customs affairs in Ukraine, main areas of activities, services rendered, customs legislations and rules valid in Ukraine.

UkrBiz.net

<http://www.ukrbiz.net/eng/trade/>

UkrBiz.net is a big Ukrainian information agency. The site provides a huge variety of business, trade, finance, legal and other related information falling into the following main sections:

- (1) Search the database of Ukrainian companies

- (2) Price lists
- (3) Computers and Internet (News, Publications)
- (4) Business Library (a number of researches, analytical reviews, reports, etc.)
- (5) Currency Rates
- (6) About Ukraine (Basic info, Ukraine's largest cities, Entering and leaving Ukraine)
- (7) Business Centers
- (8) Kyiv Business Directory
- (9) Statistics
- (10) Accountancy and Audit
- (11) Ukrainian legislation reviews
- (12) Business and Finance (Currency rates, International financial data, World stock indices, Major currency cross-rates, Inter-bank market of metals, Grain-crops futures contracts, Ukrainian stock indices, Business letters – useful clichés, Financial markets' reviews – analytics)
- (13) Telecommunications
- (14) Commerce & Foreign Trade (Incoterms 2000, Planned exhibitions, Analytics, Document templates)
- (15) Agribusiness

RUSSIA & BALTIC STATES

The Russian Economic Trends

<http://www.hhs.se/site/ret/ret.htm>

The site is supported by the Stockholm Institute of Transition Economics and East European Economies and Stockholm School of Economics. SITE offers a forum for exchange between academics and policymakers from business and government in the transition countries and in the West. It has built several databanks on enterprise and households in a large number of transition countries. The data provides a useful instrument in both academic research and the policymaking process.

Trade Policy

Agrarian Russian Information System

http://www.aris.ru/WIN_E/

Among the great variety of agro-related information the site contains:

- (1) [Minutes 9 http://www.aris.ru/WIN_E/TACIS/TACIS_2001/d/economical_analysis.html](http://www.aris.ru/WIN_E/TACIS/TACIS_2001/d/economical_analysis.html) an assessment of the need for harmonization of grain quality standards to enhance trade between CIS member states Moscow, December 2000
- (2) Action on harmonization of trade regulations

- (3) Economical http://www.aris.ru/WIN_E/TACIS/TACIS_2001/annexes_to_economik_1.html analysis on grain standards
- (4) Recommendations http://www.aris.ru/WIN_E/TACIS/TACIS_2001/recommendations_on_standards.html on Mutual Recognition of Standards among CIS Countries
- (5) Recommendations http://www.aris.ru/WIN_E/TACIS/TACIS_2001/recom_on_certification.html on Certification Policy among CIS Countries
- (6) Analysis of WTO requirements for NIS countries
- (7) Report http://www.aris.ru/WIN_E/TACIS/TACIS_2001/b/index.html on “Regional Trade Agreements among CIS Countries and WTO Accession”
- (8) Recommendations http://www.aris.ru/WIN_E/TACIS/TACIS_2001/a/index.html and Proposals on the “Establishment of a Common Agrarian Market among the CIS and the WTO Issue”
- (9) Recommendations to “CIS States on WTO Accession” http://www.aris.ru/WIN_E/TACIS/TACIS_2001/01.html
- (10) Further update on the WTO http://www.aris.ru/WIN_E/TACIS/TACIS_2001/AGRI_FOOT/ negotiations on agro-food trade liberalization.

Transition Economics Abstract Series

Publications:

- (1) Working Papers
<http://www.hhs.se/site/Publications/workingpapers/workingpapers.htm>
- (2) Staff Papers <http://www.hhs.se/site/Publications/staffpapers/staffpapers.htm>
- (3) Transition Economics Abstract Series (TEASE)
- (4) Baltic Economic Trends
<http://www.hhs.se/site/bet/bet.htm>
- (5) Key Economic Indicators
<http://www.hhs.se/site/kei/kei.htm>
- (6) Economics of Transition
http://www.hhs.se/site/Publications/ECONOMICS_OF_TRANSITION
- (7) Other
Reports (http://www.hhs.se/site/Publications/New_Reports)

ASIA

JAPAN

Bank of Japan

<http://www.boj.or.jp/en/index.htm>

Site includes monetary policy statements, research papers, speeches, reports, and statistics. Deep content offerings with current information and aggregated data offered online and for download in PDF format.

Financial Services Agency (Japan)

<http://www.fsa.go.jp/indexe.html>

From the Minister's mission statement: "The FSA is responsible for all aspects of financial regulation, from the designing of financial systems to inspection, supervision, and surveillance of financial activities. The FSA is also responsible for all kinds of financial services, such as banking, securities business, and insurance." Currently contains limited information, but likely to grow.

Japan Economic Foundation

<http://www.jef.or.jp/en/>

This site includes the latest issue of Journal of Japanese industry and also archives.

Japanese Association of Corporate Executives (Keizai Doyukai)

http://www.doyukai.or.jp/E_index.htm

Policy proposals and speeches by non-profit groups. From the site: "KEIZAI DOYUKAI membership comprises approximately 1,500 top executives of some 900 large corporations, all sharing the common belief that corporate managers should be key players in a broad range of political, economic, and social issues."

Japanese Ministry of Foreign Affairs: Economic Affairs

<http://www.infojapan.org/policy/economy/index.html>

The English language version of the Japanese Ministry of Foreign Affairs site section contains policy statements on the most recent and relevant topics related to the Japanese economy in an international context. Macroeconomics information on Japan and Asia.

Keidanren

<http://www.keidanren.or.jp/>

Japan Federation of Economic Organizations, Nationwide business association of over 1,000 companies and other industry groups in manufacturing, trade, distribution, finance, and energy.

Policy statements, proposals, and reports are divided by category from the top level of the site. Also available are transcripts of speeches by the chairman of the organization and an electronic journal. This site provides macroeconomics information including economic and fiscal policy proposals, and economic law in Japan.

Ministry of Economy, Trade and Industry of Japan (METI)

<http://www.meti.go.jp/english/index.html>

This site provides white papers, speeches, press releases and statistics related to international trade and economy. They also show laws related to METI, such as Trade and Foreign Exchange, Technology and Standards, Industries in General and Industrial Property Rights. We can also find today's METI's topics on this site.

Ministry of Finance

<http://www.mof.go.jp/english/index.htm>

Japanese Ministry of Finance contains extensive information on Japanese fiscal policies, including tax reform, customs and tariffs, and currency issues.

Index

comparative advantage	11	price elasticity of supply	32
cross-price elasticity of demand	30	producer surplus	43
dumping	83	sensitivity analysis	33
income elasticity of demand	31	stakeholders	11
inferior goods	31	static efficiency gains	63
luxury goods	31	tariff	
mercantilist	20	ad valorem	21
normal goods	31	specific	21
null hypothesis	91	utility	60
perfect competition	20	variable	
predatory pricing strategies	84	dependent	91
present value	75	independent	91
price elasticity of demand	22		

List of tables

Table 3-1 Typical Import Price Elasticities	23
Table 3-2 Estimated Price Elasticity of Demand	24
Table 3-3 Some Income Elasticities of Demand in the United States	31
Table 4-1 Capacity Utilization in Different Sectors	43

List of Figures

Table 3-1 Typical Import Price Elasticities	23
Table 3-2 Estimated Price Elasticity of Demand	24
Figure 3-1 Hypothetical Demand Curve	27
Figure 3-2 Hypothetical Demand Curve Showing Total Revenue When P=\$1 and Q=50	27
Figure 3-3 Hypothetical Demand Curve Showing Total Revenue if price is raised to \$2	28
Figure 3-4 Hypothetical Demand Curve, Illustrating that Demand is still inelastic if price is raised to \$3	29
Figure 3-5 Demand becomes more elastic as price is raised along a linear demand curve	29
Table 3-3 Some Income Elasticities of Demand in the United States	31
Figure A3-1 Illustration of Impacts of a tax on inelastic and elastic markets	36
Table 4-1 Capacity Utilization in Different Sectors	43

Figure 4-1 Producer Surplus Resulting from the Elimination of Foreign Tariffs	44
Figure 6-1 Producer and Consumer Surplus	61
Figure 7-1 Partial Equilibrium Competitive Model -Small Country	64
Figure 7-2 Partial Equilibrium Competitive Model Large Country	66
Figure 7-3 Partial Equilibrium Competitive Model Large Country, Example	67
Figure 8-1 The “J” curve.....	80
Figure 8-2 Exchange Rate and US Antidumping Cases.....	84
Figure 10-1 Line Graph / Exports from China.....	102
Figure 10-2 Multiple Line Graph / Exports from China	103
Figure 10-3 Depreciating US Dollar.....	104
Figure 10-4 Appreciating Yen / Inverted Y-axis.....	104
Figure 10-5 Pie Charts / US Imports and Exports.....	106
Figure 10-6 Vertical Bar Chart / Thailand’s Current Account Balance	107
Figure 10-7 Clustered Vertical Bar Chart / Share of GSP Imports	108
Figure 10-8 Stacked Bar Chart / Chilean Agricultural Exports	109
Figure 10-9 Stacked Chart / Trade as Percentage of GDP.....	110
Figure 10-10 Combined Line and Bar Chart / Mexico’s Current Account Deficit	111
Figure 10-11 Scatter Diagram / Protection and Growth, Southeast Asia	113
Figure 10-12 Example of Object Manipulation	113
Figure 10-13 Choosing the Appropriate Data Presentation.....	115